

Revision of the Genus *Pandanus* Stickman. Part 43 *Pandanus* in Tahiti¹

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TAHITI, IN THE SOCIETY ISLANDS, was of early discovery and its fame attracted many visitors. Its botany was first made known by the work of Sir Joseph Banks and Dr. Daniel Solander, botanists on the first voyage of Captain James Cook, who explored the island for 5 months in 1769. Banks had as artist and illustrator young Sydney Parkinson. He made innumerable paintings and drawings of plants, but he died before they left the Pacific Ocean. His notes were quickly, but unofficially, published by his brother Stanfield (1773). In this book were descriptive notes on and an illustration of *Pandanus-tectorius*. This apparent binomial was accepted and in a wide sense applied to all kinds of *Pandanus* found near the shores of the entire tropical Pacific. The author (1972) has reviewed the status of this species, and argued that the name was a monomial, and hence invalid in 1773, but validated in the German edition in 1774 by Herr Z. Even so, for lack of any significant description of

the fruit, and because the holotype is a very young pistillate inflorescence, *P. tectorius* must rest as a *species dubia*.

Next to publish Tahitian novelties in *Pandanus* was Martelli (1907:426-429), and he described three new species. On receiving additional collections, Martelli (1933: 151-155) published again on the local species, adding four new ones.

Stone (1967:55) mentioned and accepted *Pandanus tahitensis* Martelli, but later (1974: 516-517) reduced *P. Drolletianus* and *P. Macfarlanei* to the synonymy of *P. tectorius* Parkins. ex Z.

The present treatment accepts for Tahiti two introduced cultivars and 13 endemic species. Two of them are montane species, while the remaining 11 species are littoral species of the seashores and lowlands. These are peculiar to Tahiti, and are not common with Hawaii, Australia, or Ceylon, as various other authors have maintained.

KEY TO SPECIES

- A. Sterile cultivated plants; leaves unarmed. *P. spurius*, cv 'Putat'.
- A. Fertile plants,
 - B. Phalanges 7.3-10.2 cm long,
 - C. Phalange apex convex; endocarp in the upper quarter, the shoulders median; basal mesocarp 5.5-6 cm long, edible; central apical sinuses 6-9 mm deep; leaf middle 9 cm wide, introduced, cultivated. *P. odoratissimus*, var. *novi-caledonicus*, cv 'Farkoi'.
 - C. Phalange apex truncate or low convex; endocarp in the lower third to quarter,
 - D. Phalanges 7.3-8 cm long; central apical sinuses 2-4 mm deep; stigmas 1-2 mm wide, reniform. *P. papenooensis*.
 - D. Phalanges 8.8-10.2 cm long; central apical sinuses 8-10 mm deep; stigmas 2-2.5 mm wide, suborbicular; leaf middle 6 cm wide. *P. aoraiensis*.

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- B. Phalanges 3.4–6.7 cm long,
 - E. Phalanges apex truncate,
 - F. Phalanges 5.7–6 cm long, 3–3.8 cm wide; central apical sinuses 0.2–1 mm deep; endocarp 25–26 mm long; leaf middle 4–4.5 cm wide, and there with 57 parallel secondary veins in each half. *P. Drolletianus*.
 - F. Phalanges 4.4–6 cm long, 2.6–3.1 cm wide,
 - G. Central apical sinuses 0.5–2 mm deep; endocarp 20 mm long, with curved ascending shoulders, marginal carpel apices oblate pyramidal. *P. dicheres*.
 - G. Central apical sinuses 0–1 mm deep; endocarp 23 mm long, the shoulders nearly horizontal; marginal carpel apices very low convex. . . . *P. bothreus*.
 - E. Phalanges apex convex,
 - H. Carpels radial,
 - I. Phalanges 3.4–3.6 cm long, 2–2.4 cm wide; central apical sinuses 0.2–1.5 mm deep; leaf middle 2.6 cm wide, with 47 parallel secondary veins in each half. *P. Parksii*.
 - I. Phalanges 6.1–6.7 cm long; central apical sinuses 1.5–2.5 mm deep; endocarp in the upper third and 24 mm long. *P. subradiatus*.
 - H. Carpels more or less parallel or with the ends inflexed,
 - J. Central apical sinuses none,
 - K. Phalanges 5–6 mm long; leaf middle 5 cm wide, and with 53 parallel secondary veins in each half; leaf margins near the base with prickles 0.8–1 mm long, 8–30 mm apart. *P. kamptos*.
 - K. Phalanges 4.4 mm long; leaf middle 5.2 cm wide, and with 49 parallel secondary veins in each half; leaf margins near the base with prickles 1.3–1.6 mm long, 4–8 mm apart. *P. bothreus*.
 - J. Central apical sinuses 0.1–4 mm deep,
 - L. Phalanges 4.8–5.5 cm long, central apical sinuses 1–2 mm deep,
 - M. Phalanges 2.8–4 cm wide; stigmas elevated; basal mesocarp 18–20 mm long; leaf middle 6.4 cm wide, with 58 parallel secondary veins in each half. *P. distinctus*.
 - M. Phalanges 2–2.7 cm wide; stigmas flush; basal mesocarp 16–17 mm long. *P. papeariensis*.
 - L. Phalanges 5.2–6.7 cm long,
 - N. Phalanges 6.6–6.7 cm long; central apical sinuses 0.1–1 mm deep; endocarp hemispheric; leaf middle 5 cm wide, with 53–55 parallel secondary veins in each half. *P. tahitensis*.
 - N. Phalanges 5.2–6.5 cm long,
 - O. Phalanges 5.2–5.8 cm long; central apical sinuses 1–4 mm deep; endocarp 30 mm long. *P. prismaticus*.
 - O. Phalanges 5.8–6.1 cm long; apices of marginal carpels low obtuse; endocarp 23–27 mm long. . . *P. Macfarlanei*.

***Pandanus aoraiensis* sp. nov. (sect. *Pandanus*)**

NOM. VERN.: “fara moua” = mountain
Pandanus (Tahitian)

Figure 410

DIAGNOSIS HOLOTYPE: Arbor 8 m alta est,
radicibus incognitis, ramis 6–7 cm diametro

sublaevibus badiis, cicatricibus foliorum
contingentibus, foliis 1.78 m longis proxima
basem 8 cm latis in medio 6 cm latis proxima
basem U-sulcatis sed ultra fere planis et cum
plicis duobus rotundatis aegre visibilis supra
viridibus elucidis infra pallidiore viridibus in
sectione mediali cum 65 nervis parallelis sec-

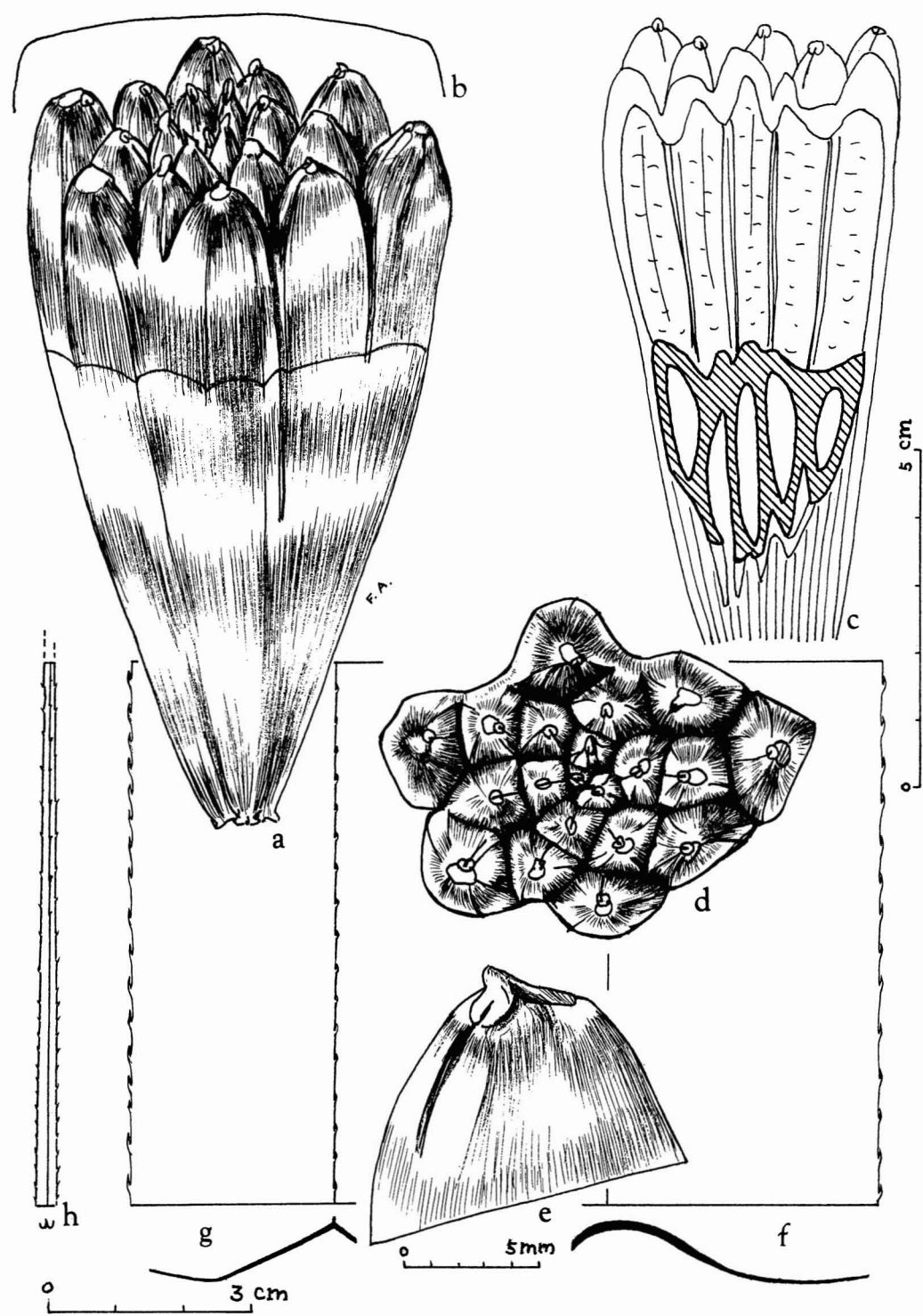


FIGURE 410. *Pandanus aoraiensis* St. John, from holotype. *a*, phalange, lateral view, $\times 1$; *b*, phalange, profile, $\times 1$; *c*, phalange, longitudinal median section, $\times 1$; *d*, phalange, apical view, $\times 1$; *e*, carpel apex with stigma, oblique view, $\times 4$; *f*, half of leaf base, lower side, $\times 1$; *g*, half of leaf middle, lower side, $\times 1$; *h*, leaf apex, lower side, $\times 1$.

undariis in dimidio quoque sed nervis tertiis non evidentis lamina late gladiata ex basi in apice trigono gracili subulato deminuenti (apice interito) basi inermi rosacea, ex 14 cm marginibus cum aculeis 1.5–2 mm longis 2–6 mm separatis adpresse adscendentibus stramineis, midnervo basali infra ultra 40 cm inermi, in sectione mediali marginibus cum aculeis 3–6 mm separatis biformatis eis majoribus 1.5–2 mm longis rectis subulatis ex basi curvata adpresse adscendentibus stramineis sed apicibus subrubris et cum illis minoribus 0.8–1.4 mm longis simulantibus sed minus adpressis alternantibus, midnervo vicinali infra cum aculeis 0.3–0.5 mm longis 3–6 mm separatis subulatis valde curvatis crebre adscendentibus stramineis cum apicibus rubris, pedunculo ultra 21 cm longo 3.2 cm diametro trilaterato foliosi-bracteato, nucleo syncarpium 8.5 cm longo 4 cm diametro cum 81 phalangibus eis 8.8–10.2 cm longis 5–6 cm latis (9 cm lato in gemini cum 32 carpellis) 3.7–4.8 cm crassis cuneiformatis 5–6-angulosis apice truncato lateribus inferis planis sinibus lateralibus nullis vel paucis fissuris angustis ad vel ultra medium descendentibus parte $\frac{1}{4}$ supera libera cum lateribus laevibus lucidis subconvexis sed carpellis lateralibus cum 0–2 angulis secundariis humilibus, carpellis 19–20 radiatis eis marginalibus cum apicibus ovoideis et cum areola vadosa concava obliqua 2–3 mm lata distali et cum stigmatibus 2–2.5 mm latis suborbicularibus elevatis obliquis badiis papillois, sinibus proximalibus fissura angusta ad vel $\frac{3}{4}$ ad fondam extensa, carpellis interioribus cum apicibus $\frac{1}{6}$ – $\frac{1}{4}$ tam grandibus quam illis marginalibus et cum stigmatibus 2.5–3 mm longis anguste ellipticis, sinibus centralibus apicalibus 8–10 mm profundis rectis anguste V-formatis, endocarpio in parte $\frac{1}{3}$ infera et 40 mm longo osseoso stramineo apice humiliter convexo supra semines cum projectionibus ovoideis humeris apicalibus latis curvatis paulo adscendentibus lateribus lateralibus 0.4–0.5 mm crassis intra rubri-mahogani-coloratis laevibus lucidis, seminibus 16–18 mm longis ellipsoideis, mesocarpio in apice carpellae cuiusque cavernam 37–40 mm longam cum aerenchyma fibris longitudinalibus paucis et parenchyma

solido, mesocarpio basali 5–17 mm longo fibroso et carnosio.

DIAGNOSIS OF HOLOTYPE: Tree 8 m tall; roots unknown; branches 6–7 cm in diameter, nearly smooth, brown, the successive leaf scars touching; leaves 1.78 m long, 8 cm wide near the base, 6 cm wide at the middle, U-sulcate near the base, but further out nearly flat and with two rounded scarcely visible pleats, above green, dull, below paler green, at midsection with 65 parallel secondary veins in each half, but no evident tertiary veins, the blade broad, sword-shaped, tapering from base to the trigonous slender subulate tip (the apex lost), the base unarmed, reddish; beginning at 14 cm the margins with prickles 1.5–2 mm long, 2–6 mm apart, subulate, appressed ascending, stramineous; the midrib below unarmed for more than 40 cm; at midsection the margins with prickles 3–6 mm apart, of two kinds, large ones 1.5–2 mm long, straight subulate from a curving base, appressed ascending, stramineous, with a reddish tip, alternating with small ones 0.8–1.4 mm long, similar but less appressed; the nearby midrib below with prickles 0.3–0.5 mm long, 3–6 mm apart, strongly curved subulate, strongly ascending, stramineous with red tips; peduncle more than 21 cm long, 3.2 cm in diameter, 3-sided, leafy bracted; syncarp core 8.5 cm long, 4 cm in diameter, bearing 81 phalanges, these 8.8–10.2 cm long, 5–6 cm wide, (9 cm wide in a twin with 32 carpels), 3.7–4.8 cm thick, cuneiform, 5–6-angled, the apex truncate, the lower sides flat, lateral sinuses none or few and then narrow cracks running down to below the middle, the upper quarter free, its sides smooth, shining, gently convex, but the lateral carpels with 0–2 low secondary angles; carpels 19–20, radial; marginal carpels with apices ovoid, and with a shallow, sloping, concave platform 2–3 mm wide, distal of the stigma, their stigmas 2–2.5 mm wide, suborbicular, elevated, oblique, brown, papillose; proximal sinuses a narrow crack running $\frac{3}{4}$ way to all the way to the valley bottom; innermost carpel apices lanceoloid, $\frac{1}{6}$ – $\frac{1}{4}$ as large as the marginal ones, their stigmas 2.5–3 mm long, narrowly elliptic;

central apical sinuses 8–10 mm deep, straight, narrowly V-shaped; endocarp in the lower third and 40 mm long, bony, stramineous, the apex low convex and its apex even with the shoulder tips, with an ovoid projection over each seed, the shoulders apical, broad, curved, slightly ascending, the lateral walls 0.4–0.5 mm thick, within red mahogany colored, smooth, shining; seeds 16–18 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 37–40 mm long, with aerenchyma of a few longitudinal fibers and continuous parenchyma; basal mesocarp 5–17 mm long, fibrous and fleshy.

HOLOTYPE: French Polynesia, Society Islands, Tahiti, Mahina Dist., Aorai, with *Cyathea*, *Fagraea*, 2530 ft alt., 4 June 1930, M. L. Grant 3,734 (BISH).

DISCUSSION: *Pandanus aoraiensis* is a member of the section *Pandanus*, as is its closest relative, *P. tamaruensis* J. W. Moore, of Raiatea, Society Islands, a species with the phalanges 7–9.3 cm long, the apex convex, the apical mesocarp 22–39 mm long, the endocarp projections over the seeds conic or lanceoloid; apices of the marginal carpels hemispheric or oblately so; marginal stigmas 1.7–2.2 mm long, broadly elliptic; leaf near the base 5.5 cm wide, and beginning at 10 cm with prickles 0.5–0.9 mm long, 1.5–3.5 mm apart, subulate, closely ascending, stramineous. *P. aoraiensis* has the phalanges 8.8–10.2 cm long, the apex truncate, the apical mesocarp 37–40 mm long, the endocarp projections over the seeds ovoid, the apices of the marginal carpels ovoid; marginal stigmas 2–2.5 mm wide, suborbicular; the leaf near the base 8 cm wide, and beginning at 14 cm with prickles 1.5–2 mm long, 2–6 mm apart, subulate, appressed ascending, stramineous.

The late Dr. Martin L. Grant marked this specimen with a new specific epithet which has remained unpublished.

The new epithet is from the name of the type locality, the mountain Aorai, and to it is attached the Latin adjectival place ending *-ensis*.

Pandanus bothreus sp. nov. (sect. *Pandanus*)

Figure 411

DIAGNOSIS HOLOTYPE: Arbor est, foliis 1.47 (+0.1?) m longis proxima basem 5.5–6 cm latis in medio 5.2 cm latis coriaceis supra nitidis viridibus infra pallidior viridibus ex-lucidis in sectione mediali cum 47 nervis parallelis secundariis in dimidio quoque nervis tertiis obscuris lamina gladiata ex basi in apice trigono deminuenti (apice interito), ex 9.5–11 cm marginibus cum aculeis 1.3–1.6 mm longis 4–8 mm separatis subarcuatis crasse subulatis adscendentibus compressis stramineis, per partem $\frac{1}{2}$ inferam midnervo inermi, in sectione mediali marginibus cum aculeis 2.5–3 mm longis 5–8 mm separatis rectis vel subarcuatis gracile subulatis adpresse adscendentibus stramineis sed apicibus badiis, phalangibus 4.4–4.6 cm longis 2.7–2.9 cm latis 1.8–1.9 cm crassis anguste obovoideis 6-angulosis apice vadose convexo lateribus inferis planis parte $\frac{1}{2}$ supra libera lateribus superis laevibus subplanis sed supra curvatis sinibus lateralibus nullis, carpellis 5 plus minusve parallelis apicibus omnibus marginalibus vadiosiore convexis et cum areola 3–4 mm lata concava distali, sinibus centralibus apicalibus 0.5–1 mm profundis sinuosis, stigmatibus 1 mm latis obdeltoideis minime elevatis, sinibus proximalibus fissura $\frac{1}{2}$ ad fundam extensa, endocarpio minime supramediis 23 mm longo obscure badio late ellipsoideo apice obtuso et supra semines cum projectionibus lanceoloideis humeris medialibus crassis breve curvatis adscendentibus lateribus lateralibus 5 mm crassis intra mahogani-coloratis lucidis sed profunde spiraliter sulcatis, seminibus 9–11 mm longis ellipsoideis, mesocarpio in apice carpellae cuiusque cavernam 8–15 mm longam cum aerenchyma fibris longitudinalibus et membranis albis, mesocarpio basali 18–21 mm longo fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: Tree; leaves 1.47 (+0.1?) m long, 5.5–6 cm wide near the base, 5.2 cm wide at the middle, coriaceous, above shiny green, below paler green and duller, at midsection with 47 parallel secon-

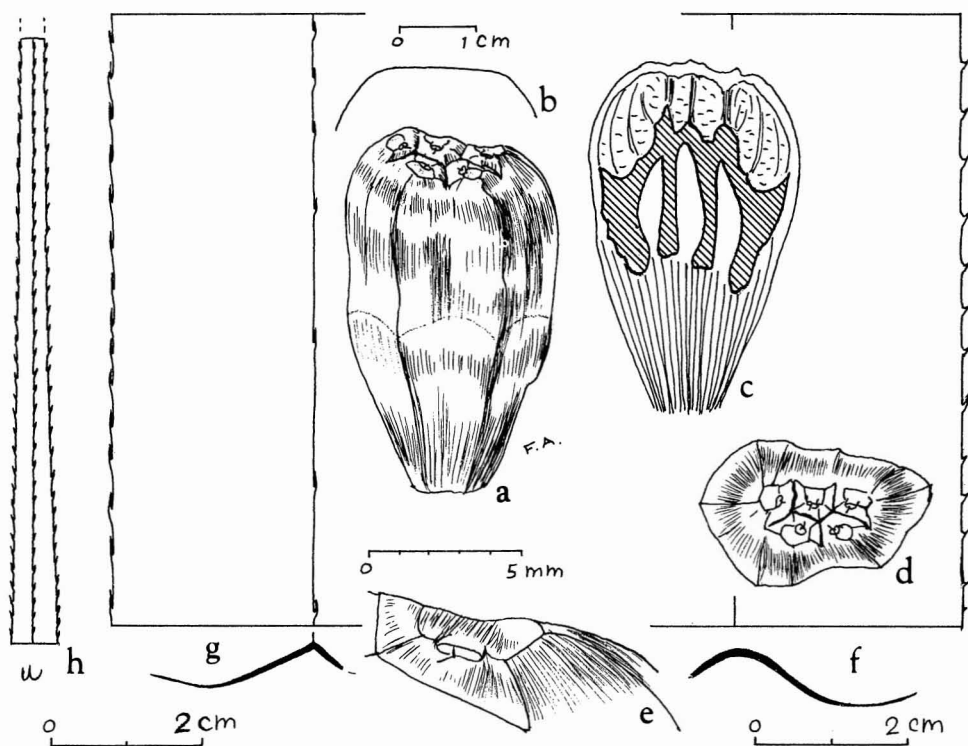


FIGURE 411. *Pandanus bothreus* St. John, from holotype. *a*, phalange, lateral view, $\times 1$; *b*, phalange, profile, $\times 1$; *c*, phalange, longitudinal median section, $\times 1$; *d*, phalange, apical view, $\times 1$; *e*, carpel apex and stigma, oblique view, $\times 4$; *f*, half of leaf base, lower side, $\times 1$; *g*, half of leaf middle, lower side, $\times 1$; *h*, leaf apex, lower side, $\times 1$.

dary veins in each half, the tertiary veins obscure, the blade sword-shaped, tapering from base to the trigonous apex (the tip lost); beginning at 9.5–11 cm the margins with prickles 1.3–1.6 mm long, 4–8 mm apart, subarcuate thick subulate, ascending, compressed, stramineous; the midrib below unarmed for the lower fifth; at midsection the margins with prickles 2.5–3 mm long, 5–8 mm apart, straight or subarcuate slender subulate, appressed ascending, stramineous with brown tips; phalanges 4.4–4.6 cm long, 2.7–2.9 cm wide, 1.8–1.9 cm thick, narrowly obovoid, 6-angled, the apex low convex, the lower sides flat, the upper half free, the upper sides smooth, flattish, but curving upward, the lateral sinuses none; carpels 5, and more or less parallel, the apices all marginal, subequal, very low convex, with a concave distal platform 3–4 mm wide; central apical sinuses 0.5–1 mm deep, sinuous; stigmas 1 mm wide, obdel-

toid, slightly elevated; proximal sinuses a narrow crack, extending halfway to valley bottom; endocarp slightly supramedian and 23 mm long, dark brown, broadly ellipsoid, the apex obtuse and with a lanceoloid projection over each seed, the shoulders median, thick, shortly curved ascending, lateral walls 5 mm thick, within mahogany colored, shining, but deeply spirally grooved; seeds 9–11 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 8–15 mm long, with aerenchyma of longitudinal fibers and white membranes; basal mesocarp 18–21 mm long, fibrous and fleshy.

HOLOTYPE: Tahiti, single tree in Mr. Brander's yard, near Papeete, August 1929, G. P. Wilder 7 (BISH).

ISOTYPE: (FI)

DISCUSSION: *Pandanus bothreus* is a member of the section *Pandanus*, as is its

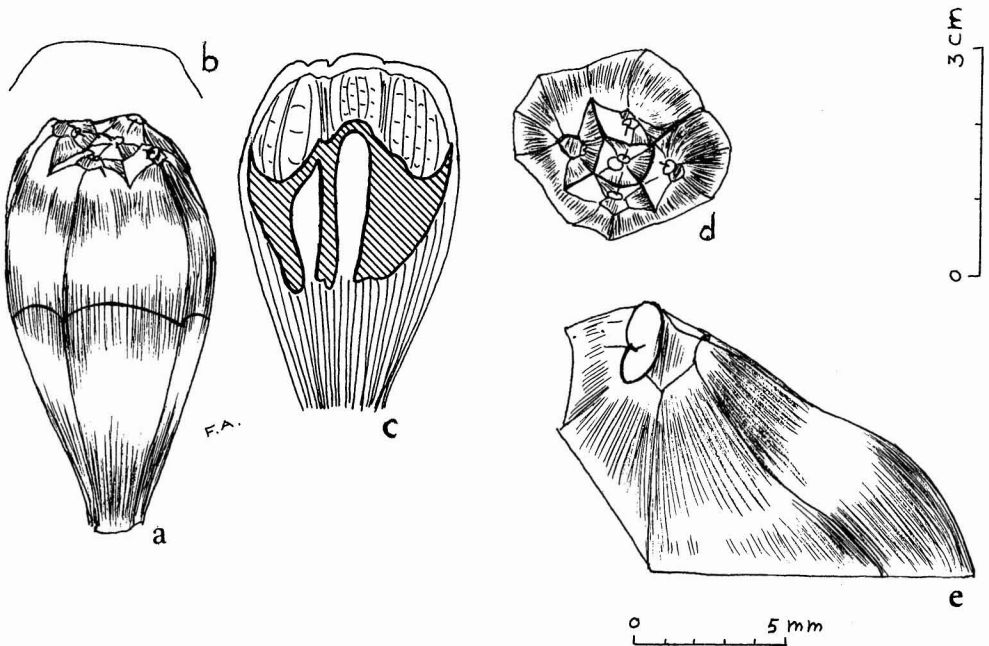


FIGURE 412. *Pandanus dicheres* St. John, from holotype. *a*, phalange, lateral view, $\times 1$; *b*, phalange, profile, $\times 1$; *c*, phalange, longitudinal median section, $\times 1$; *d*, phalange, apical view, $\times 1$; *e*, carpel apex and stigma, oblique view, $\times 4$.

closest relative, *P. Drolletianus* Martelli, also of Tahiti, a species with the phalanges 3–3.8 cm wide, 2.4–3.1 cm thick; endocarp in the upper third, and 25–26 mm long, the lower half hemispheric, the narrower upper half convex, but without marked projections; basal mesocarp 26–27 mm long; leaves 1.14–1.25 m long, 4–4.5 cm wide at the middle, and there with 57 parallel secondary veins in each half, and there the margins with prickles 1.3–1.8 mm long, 3–9 mm apart, slender subulate, strongly ascending. *Pandanus bothreus* has the phalanges 2.7–2.9 cm wide, 1.8–1.9 cm thick; endocarp slightly supramedian, 23 mm long, broadly ellipsoid, the apex obtuse and with a lanceoloid projection over each seed; basal mesocarp 18–21 mm long, leaves about 1.57 m long, 5.2 cm wide at the middle, and there with 47 secondary veins in each half, and there the margins with prickles 2.5–3 mm long, 5–8 mm apart, straight or subarcuate subulate, appressed ascending.

The new epithet is formed from the Greek *bothros*, hollow, and *-eus*, the adjectival

suffix meaning pertaining to, and it alludes to the hollow distal platform on the carpel apex.

Pandanus dicheres sp. nov. (sect. *Pandanus*)
Figure 412

DIAGNOSIS HOLOTYPE: Licet arbor est sed statura trunco ramis radicibus foliis et syncarpio incognitis, syncarpio cum 55 phalangibus eis 4.7–5 cm longis 2.6–2.9 cm latis late oblanceoloideis 5–6-angulosis apice truncato lateribus inferis planis sinibus lateralibus nullis parte $\frac{1}{3}$ supera libera lateribus marginalibus cum planis compluribus sursum curvatis, carpellis 4–5 fere parallelis sed apicibus incurvatis, stigmatibus in area minus $\frac{1}{2}$ tam lata quam phalangi, carpellis marginalibus cum apicibus oblatae pyramidalibus et ab areola concava distali 2–4 mm lata truncatis, stigmatibus 1.8–2.5 mm latis reniformibus horizontalibus vel aliquibus truncatis et obliquis badiis papillosis, sinibus proximalibus fissura profunda $\frac{1}{3}$ – $\frac{3}{4}$ ad fondam extensa, carpellis centralibus cum

apicibus ad eos marginales simulantibus sed oblioribus et $\frac{1}{2}$ – $\frac{2}{3}$ tam grandibus, sinibus centralibus apicalibus 0.5–2 mm profundis sinuosis latiore V-formatis, endocarpio in parte $\frac{5}{12}$ supera et 22 mm longo osseoso pallide badio hemisphaerico apice minori et supra semines cum projectionibus ovoideis parvis humeris ex parte $\frac{1}{3}$ supera curvate adscendentibus lateribus lateralibus 2–4 mm crassis intra badiis nitidis sed spiraliter rugosis, seminibus 8–10 mm longis ellipsoideis, mesocarpio in apice carpellae cuiusque cavernam 7–14 mm longam cum aerenchyma fibris longitudinalibus et membranis albis formanti, mesocarpio basali 16–17 mm longo fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: Doubtless a tree, but stature, trunk, branches, roots, leaves, and syncarp unknown; syncarp bearing 55 phalanges, these 4.7–5 cm long, 2.6–2.9 cm wide, broadly oblanceoloid, 5–6-angled, the apex truncate, lower sides flat, lateral sinuses none, the upper third free, its sides smooth, shining, the outer sides of the lateral carpels of several up-curving planes; carpels 4–5, nearly parallel but with in-curving ends, and the stigmas congregated in an area less than half as wide as the phalange; marginal carpels with apices oblate pyramidal and truncate by the concave platform 2–4 mm wide, distal of the stigma; stigmas 1.8–2.5 mm wide, reniform, horizontal, or some truncate and oblique, brown, papillose; proximal sinuses a deep crack, running $\frac{1}{3}$ – $\frac{3}{4}$ way to valley bottom; apices of central carpels similar but very oblate and $\frac{1}{2}$ – $\frac{2}{3}$ as large as the marginal; central apical sinuses 0.5–2 mm deep, sinuous, very wide V-shaped; endocarp in the upper $\frac{5}{12}$ and 22 mm long, bony, pale brown, hemispheric with a smaller ovoid apex and a small ovoid projection over each seed, the shoulders at the upper third, wide and curved ascending, the lateral walls 2–4 mm thick, within brown, shining but spirally rugose; seeds 8–10 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 7–14 mm long, with aerenchyma of longitudinal fibers and white membranes; basal mesocarp 16–17 mm long, fibrous and fleshy.

HOLOTYPE: French Polynesia, Society Islands, Tahiti, Hitiaa Dist., Motu Puuru, with *Cocos*, *Calophyllum*, 2 ft alt., 11 November 1930, *M. L. Grant* 4,448.2 (BISH).

SPECIMENS EXAMINED: French Polynesia, Society Islands, Tahiti, Papeari, near the seashore on Harrison Smith property, 30 August 1929, *G. P. Wilder* 3, part C (BISH, FI).

DISCUSSION: *Pandanus dicheres* is a member of the section *Pandanus*, as is its closest relative, *P. intralaevis* St. John, of Raiatea Island, a species with the phalanges 4.5–5.2 cm long, 2.1–2.8 cm wide, the central apical sinuses 2–3 mm deep, the shoulders median on the endocarp; carpels (4–) 5–7, their apices erect; stigmas 1.5–2 mm wide, suborbicular to reniform, elevated, oblique; leaf middle 3.7–6 cm wide and there with 39–52 parallel secondary veins in each half. *P. dicheres* has the phalanges 4.7–5 cm long, 2.6–3.1 cm wide, the central apical sinuses 0.5–2 mm deep, the shoulders at or near the upper rim of the endocarp; carpels 4–5, their apices in-curved and crowded; stigmas 1.8–2.5 mm wide, mostly reniform and horizontal; leaves unknown.

The new epithet is the Greek adjective *dicheres*, meaning divided in two, and it refers to the gathering of the stigmas in an area about half as wide as the phalange.

Pandanus distinctus Martelli, Univ. Calif. Publ. Bot. 17(7):153, pl. 19–20, 1933 (sect. *Pandanus*)

Figure 413

ORIGINAL DIAGNOSIS: "Syncarpium fere globosum 14–16 cm. diam. pluribus phalangibus instructum; phalangibus in parte superiore libera inter se divaricatis, in dimidia, adhaerentibus et in basilare late distinctis. Phalanges 5.5 cm. longae, in toto ambitu, turbinaeformes, raro compressae, acutissimae, penta-hexagonae, nasi contractae-angustatae, quasi caudatae vel pedunculatae, distinctae, haud fibrosae, deinsuper, usque fere ad apicem, sensim expansae et convexorotundatae, 3–4 cm. diam., e dimidio ad

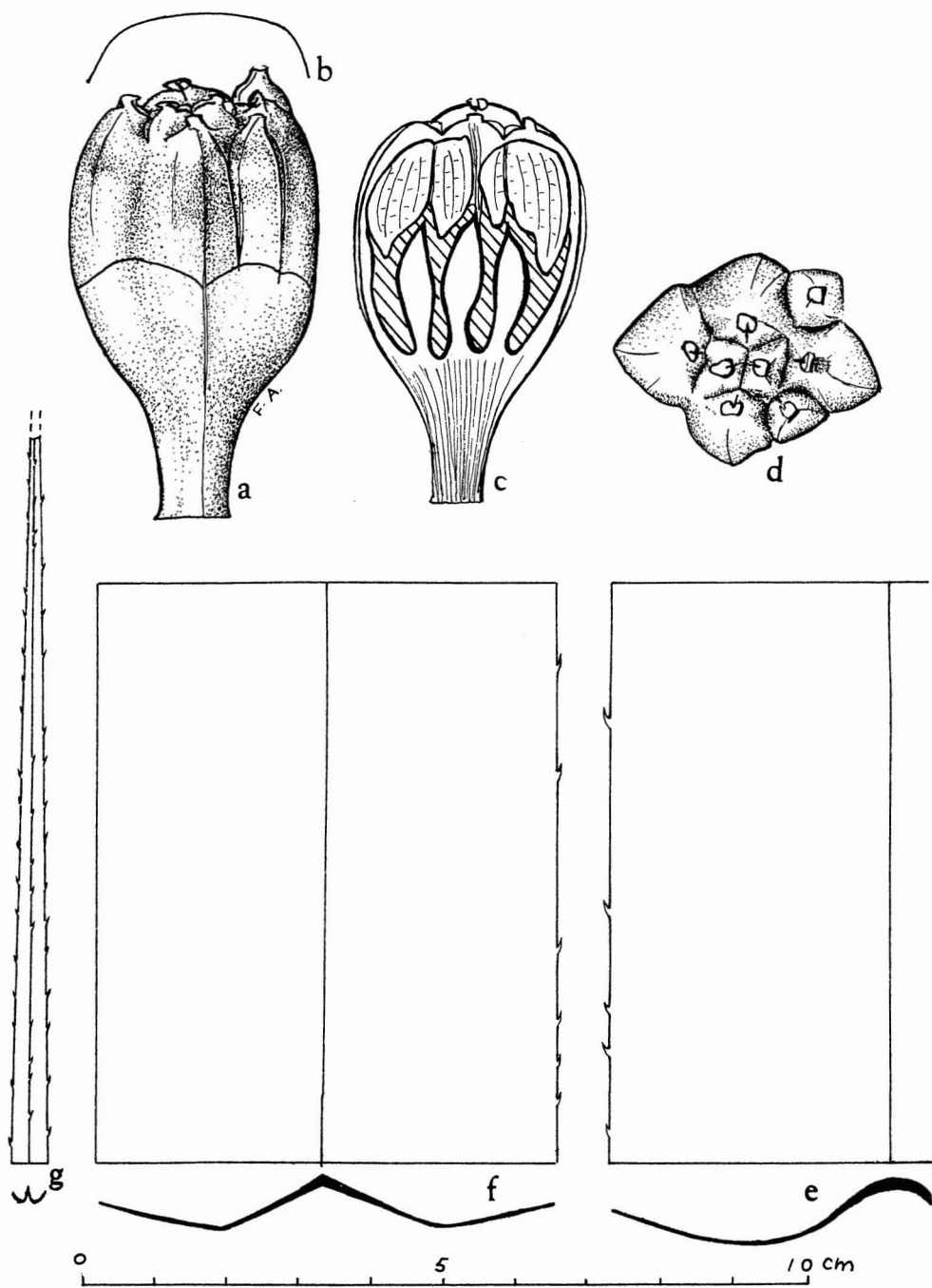


FIGURE 413. *Pandanus distinctus* Martelli, from lectotype. *a*, phalange, lateral view, $\times 1$; *b*, phalange, profile, $\times 1$; *c*, phalange, longitudinal median section, $\times 1$; *d*, phalange, apical view, $\times 1$; *e*, half of leaf base, lower side, $\times 1$; *f*, leaf middle, lower side, $\times 1$; *g*, leaf apex, lower side, $\times 1$.

verticem, laeves et, in sicco, subnitidae; vertice explanatae, pluriloculares, loculis 5–7, interdum 8, parvis et laevibus, convexo-angulosis, a sulco angusto manifesto, sed parum profundo, separatis. Stigmata \pm lata, prominentia. Endocarpium osseum in dimidia parte phalangis situm, fere 2.5 cm. spissum, ambitu utrinque plavum, supra ambitu sinuoso-pyramidatum subtus sinuoso-fimbriatum. Mesocarpium superum cum cavernis fere subaequalibus, circiter 1 cm., inferum fibrosum compactum.”

EXPANDED DIAGNOSIS OF HOLOTYPE: Roots and stems unknown; leaf 1.46 (+0.1–0.2?) m long, 7.8 cm wide near the base, 6.4 cm wide at the middle, coriaceous, light olive green and shiny above, paler green below, U-sulcate, 2-pleated, at midsection with 58 parallel secondary veins in each half, the tertiary veins not evident, the blade sword-shaped, tapering from base to tip (the apex lost), the base unarmed, pale; beginning at 10 cm the margins with a few prickles 2–2.3 mm long, 5–29 mm apart, subarcuate subulate, compressed, ascending, stramineous with brown tips; the midrib unarmed to beyond the middle; at midsection one margin unarmed, the other with prickles 2–2.3 mm long, 5–59 mm apart, subulate, appressed ascending, becoming brown; near the apex the margins and midrib below with prickles 0.7–1 mm long, 3–8 mm apart, thick subulate, almost appressed ascending, brown; syncarp ellipsoid-subglobose, 14–16 cm long, 12.5–13 cm in diameter, bearing about 72 phalanges, these 4.8–5.5 cm long, 2.8–4 cm wide, 2.1–2.7 cm thick, obovoid to broadly obovoid and cuneate, 4–6-angled, the apex truncate (or rarely in the broadest ones low convex), lower sides smooth, plane, lateral sinuses none (or rarely 1–2 narrow and distinct down to the middle), upper half free, the sides of gently curving planes, smooth, shining; carpels 5–8, mostly 5–6, ascending, more or less parallel, the apices of the marginal ones low convex, angled, mostly with a concave platform 1–3 mm wide, distal of the stigma, apices of the inner carpels $\frac{1}{3}$ – $\frac{1}{2}$ as large as the marginal ones, similar, but symmetrical; central apical si-

nuses 1–2 mm deep, straight or gently curving, a narrow crease, then with wide spreading sides; stigmas 2–3 mm wide, suborbicular to reniform, brown, papillose, elevated and oblique; proximal sinuses deep, sinuous, running from halfway to all the way to the valley bottom; endocarp in the upper $\frac{2}{5}$ and 20–25 mm long, bony, dark mahogany colored, transversely ellipsoid, with low conic projections over the seeds, and the upper rim with ascending winglike shoulders, lateral walls 3–4.5 mm thick, within smooth and shining but spirally striate; seeds 12–13 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 8–14 mm long, filled with aerenchyma of longitudinal fibers and close white membranes; basal mesocarp 18–20 mm long, fibrous and fleshy.

LECTOTYPE: Society Islands, Tahiti, Papeari, near the seashore, on Harrison Smith property, August 1929, *Gerrit P. Wilder* 5 (UC).

ISOTYPES: (B, BISH, BM, F, FI, G, K, MO, US). Types examined.

SPECIMENS EXAMINED: Society Islands, Tahiti, Papara, Cl. Clay's yard, August 1929, *Wilder* 6 (BISH); Mataiea Dist., coral flat by shore, 1 m alt., fleshy base of phalanges reddish, 10 May 1934, *H. St. John & F. R. Fosberg* 14,179 (BISH).

DISCUSSION: *Pandanus distinctus* is very similar to the slightly older species *P. papeariensis* Martelli, which grew in the same coastal grove at Papeari. The only actual differences seem to be that *P. distinctus* has the phalanges 2.8–4 cm wide and mostly obovoid to broadly obovoid, while *P. papeariensis* has them 2–2.7 cm wide and oblanceoloid. However, by careful picking one can find phalanges of each that seem inseparable.

Martelli explained his epithet, “I have called this species ‘*distinctus*’ for the reason that the phalanges are separated from one another in their lower parts. This character, however, is not peculiar to this species, since I have observed it also in other species.” The upper left figure in his plate 20 shows this feature; the three phalanges still attached to

the core have their lower third contracted and remote from the neighboring ones. There is indeed nothing diagnostic about this, for all species of the section *Pandanus* have the lower part of each phalange with soft fruiting flesh between the longitudinal fibers. The phalanges are borne, closely set on a core. The lower parts are crowded by the neighboring phalanges and develop with 4–6 angles and flat sides, depending on the lateral pressure received. In the lower part most of the tissue is the soft flesh, which on falling is usually eaten by ants or other animals. If the specimen is dried by a botanist, the flesh shrinks to a slight remnant, and the lower part contracts, sometimes retaining the epidermis, but if fully ripe, more commonly losing it and retaining only the long fibers. In all cases the lower part is much shrunken in diameter. It is strange indeed, that in 1931 Martelli did not seem to be aware of this inevitable shrinking, for he had been doing monographic work and publishing on the genus for 29 years. To be sure, his work was done only in the herbarium, as he never did field work in *Pandanus* country, and never collected a single indigenous specimen of it. Even so, it was naive not to have learned that the soft, fleshy part of the fruit contracted when dried.

Martelli did not customarily designate type specimens, but in his 1933 paper in the University of California Publications in Botany, he did so in two instances. For *Pandanus tessellatus* and for *P. Macfarlanei* he indicated "in Herb. Univ. Calif." For the seven other new species and varieties of Pandanaceae in this publication on Tahiti and Rarotonga, there is no designation of a type or indication of the herbarium where it was deposited. In general, Martelli retained a portion of each specimen he studied for his personal herbarium (now in the university herbarium at Firenze), and returned the larger, main portion to the original herbarium. In this case it was to the herbarium of the University of California at Berkeley. G. P. Wilder was the collector of most of these specimens, and he was on the staff of the Bishop Museum, Honolulu, but the University of California was the go-between,

and in most instances retained the best specimen. Hence, unless otherwise indicated, it is best to make the specimen in the University of California the lectotype. Of the numerous duplicates of this type number, only the Berkeley specimen has a leaf.

Pandanus Drolletianus Martelli, Webbia 2: 426–427, 1907; 4(1): 12, 48, 94, t. 3, figs. 6–8, 1913, and legend 1914; Soc. Tosc. Sci. Nat., Atti, Mem. 42: 116, 1932 (reprint p. 6); Univ. Calif. Publ. Bot. 17(7): 151, 1933; Stone, Bot. Jahrb. 94: 516, 1974 (sect. *Pandanus*)

Figure 414

ORIGINAL DIAGNOSIS: "Folia pergamenacea ultra metralia, 5 cm. lata, basi sensim parum dilatata, ibique amplexantia, apicem versus attenuata et sensim in flagellum longum subulatum protracta, utrinque levia, in pagina inferiori subinconspicue longitudinaliter obsolete venulosa; costa media tenui, basin versus evanescenti, usque ad medium inermi, deinsuper usque ad extremum apicem aculeis raris, parvis, tenuibus, acutis munita; marginibus in parte basilari inermibus, deinsuper crebriusculae tenuiter acutis et subpatule dentato-serratis. Syncarpium globosum, 15 cm. diam.; phalanges numerosae, fere in earum tertiam superiorem partem liberae et divaricatae, elongato-pyriformes, obscure pentagonae, $2\frac{1}{2}$ – $3\frac{1}{2}$ cm. latae, faciebus subconvexo-planis, levibus, vertice subplano; loculis 5–6, superficialibus, vix convexis et obsolete angulosis; sulcis interocularibus, tenuibus, superficialibus; stigmatibus parvis, erecto vel obliquo. Endocarpium osseum, in sectione longitudinali ambitu orbiculare; mesocarpii superi cavernae mediocres, fibroso-flocculosae."

EXPANDED DIAGNOSIS OF HOLOTYPE: Doubtless treelike, but roots, trunk, and branches not recorded or preserved; leaves 1.14–1.25 m long, 5.8–6.3 cm wide near the base, 4–4.5 cm wide at the middle, coriaceous, above shiny green, below pale green and apparently glaucous, U-sulcate, 2-pleated, at midsection with 53–57 parallel secondary veins in each half, but no visible tertiary

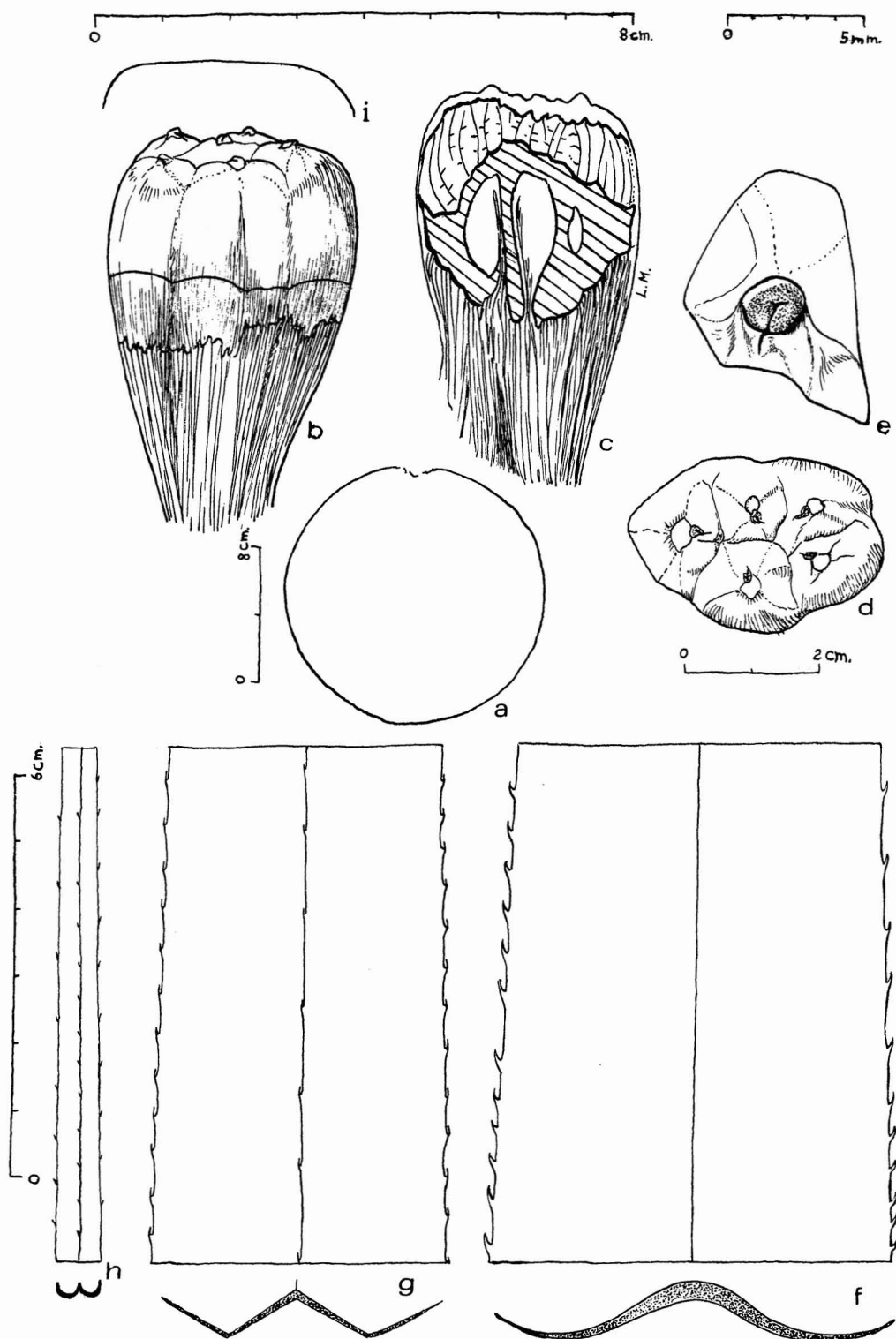


FIGURE 414. *Pandanus Drolletianus* Martelli, from holotype. *a*, profile of syncarp, $\times \frac{1}{4}$; *b*, phalange, lateral view, $\times 1$; *c*, phalange, longitudinal median section, $\times 1$; *d*, phalange, apical view, $\times 1$; *e*, carpel apex and stigma, apical view, $\times 4$; *f*, leaf base, lower side, $\times 1$; *g*, leaf middle, lower side, $\times 1$; *h*, leaf near apex, lower side, $\times 1$; *i*, phalange, profile, $\times 1$.

veins, the blade sword-shaped, tapering from the base into the trigonous slender subulate apex, this at the point 10 cm down 2 mm wide, the base unarmed, pale; beginning at 10–15 cm the margins with prickles 2–2.2 mm long, 3–17 mm apart, arcuate subulate, ascending to strongly ascending, stramineous; the midrib below unarmed for the lower third or more; at midsection the margins with prickles 1.3–1.8 mm long, 4–8 mm apart, slender subulate, appressed ascending, reddish brown, on one margin, but on the other margin the prickles 1.3–1.5 mm long, 3–9 mm apart, subarcuate stout subulate, compressed, strongly ascending, the body stramineous, the tip reddish brown; the nearby midrib below with prickles 1–1.3 mm long, 11–17 mm apart, arcuate slender subulate, strongly ascending, stramineous but the tips reddish brown; on the subulate apex the margins wholly unarmed, the midrib below with stout subulate prickles 0.3–0.5 mm long, 6–22 mm apart, strongly ascending, reddish brown; infructescence terminal, bearing a solitary syncarp; peduncle 36 cm long, 20 mm in diameter, 3-sided, somewhat clavate, nearly straight, leafy bracted; dried core 6 cm in diameter, fibrous; syncarp 15 cm in diameter, globose, bearing 84 phalanges, these 5.7–6 cm long, 3–3.8 cm wide, 2.4–3.1 cm thick, pyriform to elliptic obovoid, 5–6-angled, the apex truncate (or rarely very low convex), the lower sides flat, lateral sinuses none, upper third free, the sides gently convex, smooth, shining; carpels 4–6, ascending, more or less parallel, mostly marginal, the apices of the marginal ones very low convex, rounded or with a few slight angles, mostly with a shallow concave platform 2–4 mm wide, distal of the stigma; stigmas 2–2.5 mm long, broadly elliptic; proximal sinuses wide and running $\frac{1}{4}$ – $\frac{2}{3}$ way to valley bottom; central apical sinuses 0.2–1 mm deep, scarcely perceptible and appearing as lines in a checkered pattern; endocarp in the upper third and 25–26 mm long, bony, brown, the lower half hemispheric, the narrower upper half convex and the apex with a bristle to a stigma, the shoulders prominent, curved divergent, the lateral walls 5 mm thick, within shining, smoothish but spirally

striate; seeds 12–14 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 6–16 mm long, with strong longitudinal fibers; basal mesocarp 26–27 mm long, fibrous and fleshy.

HOLOTYPE: “Isola Tahiti nell’Arcipelago della Società.—Racc. Drollet, 1907 (no. X in herb. Martelli).” Now in (FI). Type examined. Martelli added (p. 427), “Al Sig. Alessandro Drollet francese dimorante a Tahiti, che gentilmente raccolse per me nel circondario di Papeete alcuni *Pandanus*, dedico questa specie esternandogli la mia gratitudine.”

SPECIMENS EXAMINED: Society Islands, Tahiti, Hitiaa, in mud at point where river enters sea, 9 September 1955, *H. S. McKee* 3,096 (BISH); Papeete, hillside behind, 300 m alt., 11 September 1955, *McKee* 3,101 (BISH); Papawa Harbor, 16 June 1922, *W. A. Sutchell & H. E. Parks* 366 (US).

DISCUSSION: Martelli in his diagnosis stated that the leaves were of the texture of parchment. That is a good description of the nature of these herbarium specimens, but it is of no significance. The dry epidermis of both sides of the leaves is thin and is flaking off, especially at base. This dry, parchment-like surface is regularly found on fallen leaves that have half rotted on the ground or on specimens that have been pressed but not properly dried. The latter status evidently explains why these leaves, in some parts, resemble parchment. This publication of Martelli’s was one of his earliest, but even at the end of more than three decades of monographic work on the genus, he had no field experience and worked solely in the herbarium.

Martelli described the syncarp as globose. There still remains the complete syncarp which he had been furnished. It is now somewhat ellipsoid, but it had been reconstituted and held together by glue. With such disintegrating syncarps, he usually put them together in a matrix of fibers with glue or putty. This specimen must have been partly disintegrated, or he would not have reassembled it and glued it to make it stay together.

It is impossible now to prove the exact original shape, so his statement that the syncarp was globose is accepted.

Stone (1974:517) reduces this species to *P. tectorius* Parkins. ex Z.

***Pandanus kamptos* sp. nov. (sect. *Pandanus*)**

Figure 415

DIAGNOSIS HOLOTYPE: Arbor 10 m alta est, trunco 17 cm diametro, radicibus suffulcibus 3.5 cm diametro badiis in lineis verticalibus muriculatis, cortice badio laevi lucido, cicatricibus foliorum 6–10 mm separatis, ramis 7 cm diametro laevibus, pedunculis et bracteis incognitis, foliis 1.7 m longis proxima basem 6.5 cm latis in medio 5 cm latis coriaceis U-sulcatis 2-plicatis supra nitidis olivaceis infra pallide viridibus et licet glaucis in sectione mediali cum 53 nervis parallelis secundariis in dimidio quoque sed nervis tertiis non evidentis, lamina gladiata ex basi in apice trigono gracile subulato deminuenti eo in puncto 10 cm ex apice 2 mm lato basi inermi pallida, ex 6.5 cm marginibus cum aculeis 3–4.5 mm longis 5–10 mm separatis arcuatis crasse subulatis compressis stramineis, midnervo infra in parte $\frac{1}{5}$ infera inermi, in sectione mediali marginibus cum aculeis 2.3–2.7 mm longis 5–12 mm separatis rectis subulatis adpresse adscendentibus stramineis, midnervo vicinali infra cum aculeis 0.8–1 mm longis 8–30 mm separatis arcuatis subulatis adpresse adscendentibus stramineis, in apice subulato marginibus cum aculeis 0.3 mm longis paucis remotis arcuatis subulatis adscendentibus stramineis, sed midnervo infra inermi, syncarpio 18–19 cm longo 12.5–17 cm diametro, cum 70–91 phalangibus eis 5–6 cm longis 3–3.8 cm latis 2.6–3.2 cm crassis cuneatis obovoideis 4–5-angulosis apice convexo subcurvato laevi sine valleculis lateribus inferis planis sinibus lateralibus nullis parte $\frac{1}{2}$ supera libera cum lateribus laevibus nitidis subconvexis sine angulis secundariis, carpellis 5–7 adscendentibus plus minusve parallelis omnibus convexis et in apice phalangis miscentibus, carpellis marginalibus vadosae convexis sed cum areola concava lata

distali 3–8 mm lata, sinibus proximalibus fissura $\frac{1}{2}$ ad fundam extensa, carpellis centralibus cum apicibus $\frac{1}{3}$ – $\frac{2}{3}$ tam grandibus quam illis marginalibus vadosae convexis et cum areola concava, sinibus centralibus apicalibus lineis marginalibus formantibus, endocarpio in parte $\frac{2}{5}$ supera et 20–21 mm longo osseoso badio subhemisphaerico sed corpore centrali $\frac{1}{2}$ tam lato elevato hemisphaerico et supra semines cum projectionibus conicis parvis humeris ex parte $\frac{1}{3}$ supera crassis latis et cum apicibus gracilibus aliformatis adscendentibus lateribus lateralibus 5–7 mm crassis intra pallide rubribadiis lucidis sublaevibus sed spiraliter striatis, seminibus 11–13 mm longis ellipsoideis, mesocarpio in apice carpellae cuiusque cavernam 10–14 mm longam cum aerenchyma fibris longitudinalibus et membranis albis formanti, mesocarpio basali 20–23 mm longo fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: Tree 10 m tall; trunk 17 cm in diameter; prop roots 3.5 cm in diameter, brown, muriculate in vertical lines; bark brown, smooth, shining; the leaf scars 6–10 mm apart; branches 7 cm in diameter, smooth; peduncle and bracts unknown; leaves 1.7 m long, 6.5 cm wide near the base, 5 cm wide at the middle, coriaceous, U-sulcate, 2-pleated, shiny olive green above, pale green and apparently glaucous below, at midsection with 53 parallel secondary veins in each half, but no evident tertiary veins, the blade sword-shaped, tapering from base to the trigonous slender subulate apex, this at the point 10 cm down 2 mm wide, the base unarmed, pale; beginning at 6.5 cm the margins with prickles 3–4.5 mm long, 5–10 mm apart, arcuate thick subulate, compressed, stramineous; the midrib below unarmed for the lower fifth; at midsection the margins with prickles 2.3–2.7 mm long, 5–12 mm apart, straight subulate, appressed ascending, stramineous; the nearby midrib below with prickles 0.8–1 mm long, 8–30 mm apart, arcuate subulate, appressed ascending, stramineous; near the apex the margins with prickles 0.3 mm long, few and remote, arcuate subulate, ascending, stramineous; but the midrib below unarmed;

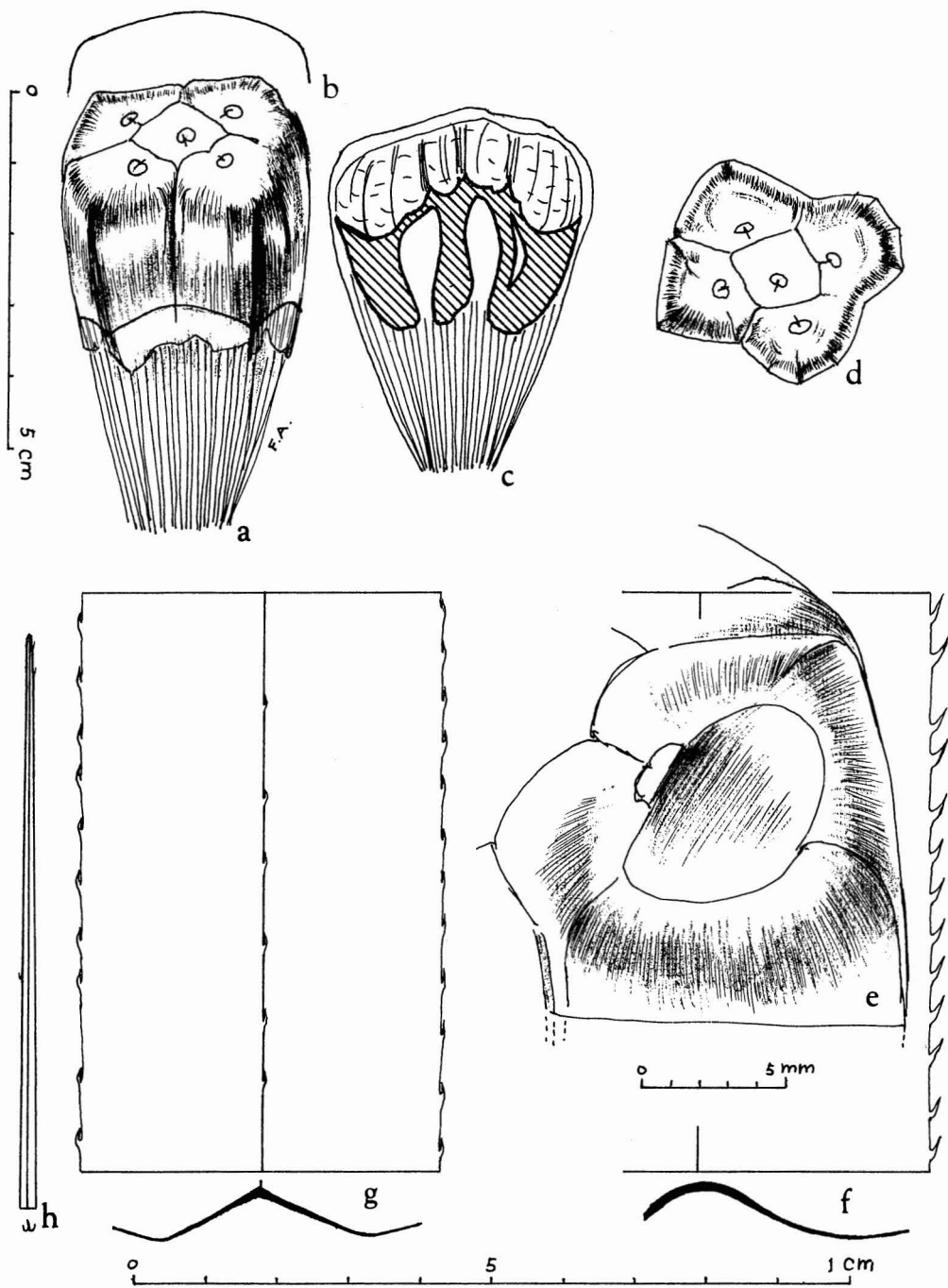


FIGURE 415. *Pandanus kamptos* St. John, from holotype. *a*, phalange, lateral view, $\times 1$; *b*, phalange, profile, $\times 1$; *c*, phalange, longitudinal median section, $\times 1$; *d*, phalange, apical view, $\times 1$; *e*, carpel apex and stigma, apical view, $\times 4$; *f*, half of leaf base, lower side, $\times 1$; *g*, leaf middle, lower side, $\times 1$; *h*, leaf apex, lower side, $\times 1$.

syncarp 18–19 cm long, 12.5–17 cm in diameter, ellipsoid, bearing 70–91 phalanges, these 5–6 cm long, 3–3.8 cm wide, 2.6–3.2 cm thick, cuneate obovoid, 4–5-angled, the apex convex, gently curved, smooth and without valleys, the lower sides flat, lateral sinuses wanting, the upper half free, its sides smooth, shining, gently convex, without secondary angles; carpels 5–7, ascending, more or less parallel, all their apices convex and blending into the curve of the phalange apex; marginal carpel apices low convex but with a broad shallow concave platform 3–8 mm wide, distal of the stigma; the proximal sinuses a crack running halfway to the sinus line; central carpels with apices $\frac{1}{3}$ – $\frac{2}{3}$ as large as the marginal ones, low convex and also with a concave platform; central apical sinuses evident by the line of union but not forming a valley; endocarp in the upper $\frac{2}{5}$ and 20–21 mm long, bony, chocolate brown, nearly hemispheric, but the central body only half as wide, elevated, hemispheric, with a small conic projection over each seed, the shoulders at the upper third, thick and broad and with slender winglike ascending tips, the lateral walls 5–7 mm thick, within light reddish brown, shining, smoothish but spirally striate; seeds 11–13 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 10–14 mm long, with aerenchyma of longitudinal fibers and white membranes; basal mesocarp 20–23 mm long, fibrous and fleshy.

HOLOTYPE: Society Islands, Tahiti, Hitiaa Dist., Motu Puuru, with *Cocos*, *Calophyllum*, 2 ft alt., 14 November 1930, *M. L. Grant* 4448.1 (BISH).

ISOTYPES: (FI, UC)

DISCUSSION: *Pandanus kamptos* is a member of the section *Pandanus*, as is its closest relative, *P. tahitensis* Martelli, var. *exiguus* J. W. Moore, of Raiatea Island, Society Islands, a variety with the phalanges 5.3–5.6 cm long, 2.1–3.2 cm wide, the apex low convex; endocarp in the upper third, the lanceoloid projections extending almost to the stigmas, the lateral walls 3–4 mm thick; leaves 1.25 m long, the middle 4.5 cm wide,

and beginning at 10–11 cm from the base the margins with prickles 1.5–2 mm long, 6–12 mm apart, subarcuate subulate, strongly ascending, wholly stramineous or with pinkish tips. *Pandanus kamptos* has the phalanges 5–5.2 cm long, 3–3.8 cm wide, the apex almost hemispheric; endocarp in the upper $\frac{2}{5}$ and the low conic upper projections 8–9 mm distant from the stigmas, the lateral walls 5–7 mm thick; leaves 1.7 m long, the middle 5 cm wide, and beginning at 6.5 cm from the base the margins with prickles 3–4.5 mm long, 5–10 mm apart, arcuate thick subulate, compressed, stramineous.

Some of Grant's duplicates of this plant are numbered 4448.1, and these have phalanges 5–6 cm long. Others, evidently from another tree, have similar phalanges, but these are 4.6–5 cm long. They all seem conspecific.

The new epithet is the Greek adjective *kamptos*, curved, and it is given with reference to the profile of the phalange apex.

Pandanus Macfarlanei Martelli, Webbia 2:426, 1907; Stone, Bot. Jahrb. 94:517, 1974.

P. Mac-Farlanei Martelli, Webbia 4(1): 22, 54, 94, 97, t. 2, figs. 2–4, 1913.

P. odoratissimus L.f., subsp. *P. Mac-Farlanei* Martelli, Soc. Tosc. Sci. Nat., Atti, Mem. 42:117, 1932 (reprint p. 7).

P. Mac Farlanei Martelli, Univ. Calif. Publ. Bot. 17(7):151, pl. 17, 1933 (sect. *Pandanus*)

Figure 416

ORIGINAL DIAGNOSIS: "Folia subcoriacea, 1.30 m. longa, 5 cm. lata, in ima basi breviter abrupte dilata, apicem versus sensim longeque attenuato-acuminata, subtus crebre longitudinaliter conspicue venulosa; costa media acuta, prominenti, fere usque ad imam basin producta, remotiuscule usque ad tertiam inferiorem partem aculeis parvis, tenuibus, reverso-uncinatis praedita; marginibus, in parte basilari nudis, deinsuper dentibus tenuibus, subdistantibus, acutis, subulatis, erecto-patulis armatis. Syncarpium solitarium, globosum, 19 cm. diam.;

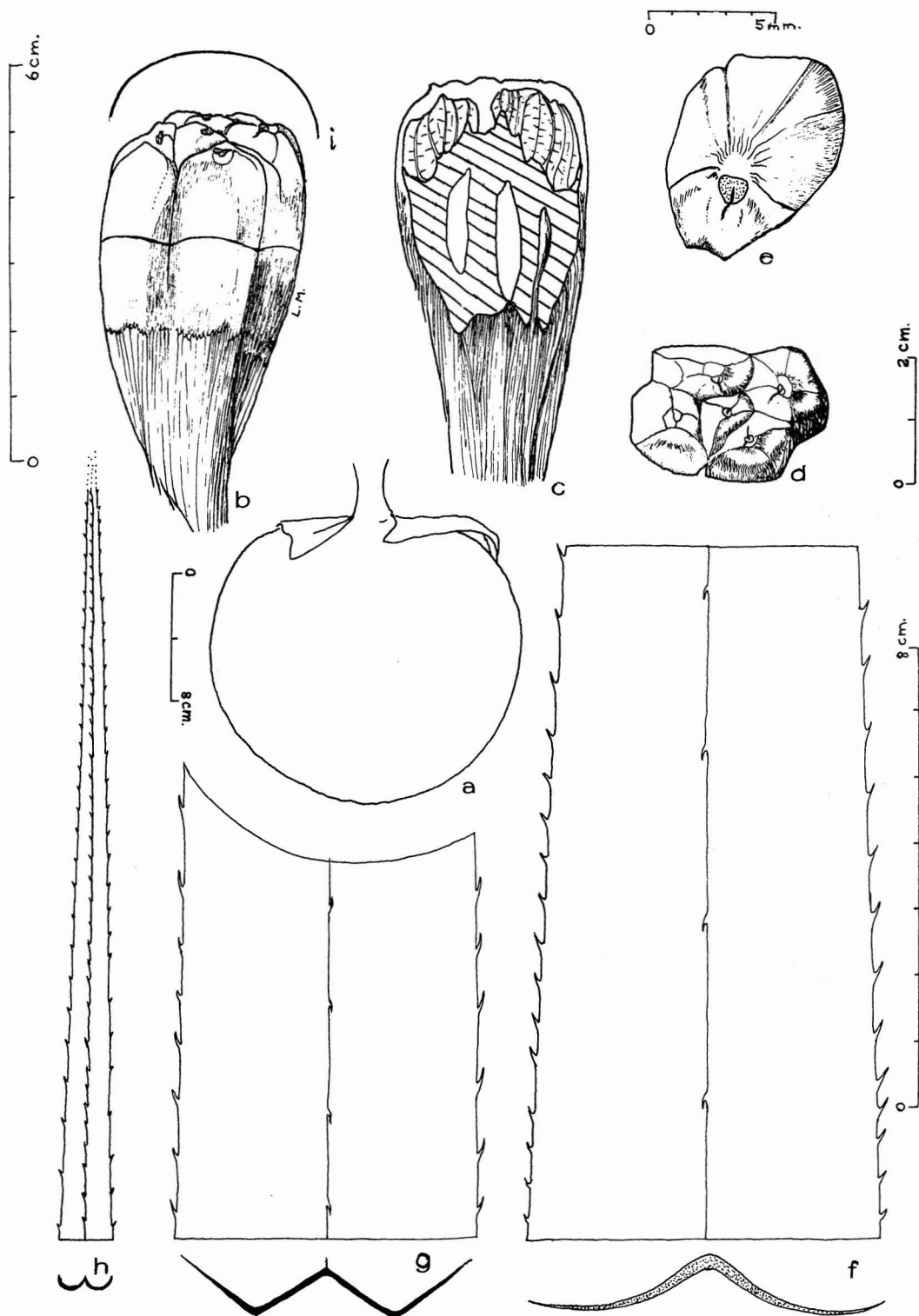


FIGURE 416. *Pandanus Macfarlanei* Martelli, from holotype. *a*, profile of syncarp, $\times \frac{1}{4}$; *b*, phalange, lateral view, $\times 1$; *c*, phalange, longitudinal median section, $\times 1$; *d*, phalange, apical view, $\times 1$; *e*, carpel apex and stigma, apical view, $\times 4$; *f*, leaf base, lower side, $\times 1$; *g*, leaf middle, lower side, $\times 1$; *h*, leaf apex, lower side, $\times 1$; *i*, phalange, profile, $\times 1$.

phalanges numerosissimae, dense congeste et tantum in earum quartam superiorem partem liberae et parum divaricatae, elongatae, pyriformes, 6 cm. longae, $3-3\frac{1}{2}$ cm. latae, persaepe compressae, 2 cm. longae crassae, pentagonae, superne subrotundate, in vertice planae, loculis, 4-6, parvulis, breviusculis, pyramidatis, angulosis; sulcis interocularibus mediocribus; stigmatibus parvis, obliquis vel erectis. Endocarpium osseum, in sectione longitudinali suborbiculare; mesocarpii superi cavernae parvae, intus spongiosae et fibroso-flocculosae."

DIAGNOSIS OF HOLOTYPE: Leaves 1.14-1.36 (+0.03-0.1?) m long, 5-5.5 cm wide near the base, 4.7-5.2 cm wide at the middle, coriaceous, shiny green above, pale below, narrowly U-sulcate, 2-pleated, at midsection with 39 parallel secondary veins in each half, the tertiary cross veins seen nearly throughout, forming oblong to square meshes, the blade ligulate, then in the outer third narrowing to the trigonous slender subulate apex (the tip lost in ours), the base unarmed, pale, beginning at 6-7 cm the margins with prickles 2-3 mm long, 3-12 mm apart, the first ones few, subulate, ascending from a geniculate base, the following ones straight subulate, ascending, stramineous with pink tips; beginning at 9.5 cm the midrib below with prickles 1.2-2 mm long, 7-28 mm apart, thick subulate, strongly reflexed from a conic base, stramineous; at midsection the margins with prickles 2.5-3 mm long, 6-13 mm apart, straight slender subulate from a long sloping base, very strongly ascending, stramineous with red tips; the nearby midrib below with prickles 1.5-2 mm long, 17-20 mm apart, reflexed hamate, stramineous; near the apex the margins and midrib below with prickles 0.4-0.8 mm long, 2-4 mm apart, stout subulate, ascending, red-tipped; the pleats unarmed; infructescence with a solitary syncarp; peduncle 2 cm in diameter, 3-sided; syncarp 16 cm long, 18 cm in diameter, subglobose (Martelli said "globosum, 19 cm diam. The syncarp is entire, held in a net, but some of the phalanges are loose, and the syncarp may have flattened a little during the years, and may originally have

been globose"), bearing 198 phalanges, these 5.8-6.1 cm long, 2.3-3.4 cm wide, 1.9-3.3 cm thick, (-4.2 cm wide in a double with 6 carpels), oblanceoloid, 4-6-angled, the apex convex to high convex, the lower sides flat, lateral sinuses none (or few), the upper quarter free, the surface nearly smooth, shining, gently convex; carpels 3-7, ascending, nearly parallel, the apices of the marginal ones broadly obtuse, with several low angles, and a few of them with a concave platform 1.5-3 mm wide, distal of the terminal stigma, the inner apices oblate pyramidal, as large as to $\frac{2}{3}$ as large as the outer ones; stigmas 1.5-2.8 mm long or wide, obovate to reniform and truncate, mostly oblique, brown, papillose; proximal sinuses narrow, extending halfway or all the way to the valley bottom; central apical sinuses 1.5-2.5 mm deep, V-shaped, sinuous; endocarp in the upper $\frac{2}{3}-\frac{3}{5}$ and 23-27 mm long, bony, dark brown, the apex with conic projections over the seeds, the shoulders short, curved ascending, lateral walls 4.5-6 mm thick, within shining, spirally striate; seeds 10 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 8-13 mm long, with aerenchyma of strong longitudinal fibers and some parenchyma; basal mesocarp 22-25 mm long, fibrous and fleshy.

HOLOTYPE: "Presso Papeete nell'Isola Tahiti, Arcipelago della Società.—Racc. dal Sig. A. Mac Farlane 1904 (no. XI in herb. Martelli.)" Now in (FI). Specimen examined.

DISCUSSION: Martelli published on *Pandanus Macfarlanei* four times, but his nomenclature for and his delineation of the species need discussion. In 1907 he published the valid binomial *P. Macfarlanei* for his effectively published new species, basing it upon a single collection from Tahiti, A. Mac Farlane no. XI, and he so maintained it in 1913; in 1932 he published it as *P. MacFarlanei*; then in 1933 as *P. MacFarlanei*. The name of Mr. Mac Farlane is not a Latin name, so a botanist forming a specific epithet from it has a broad latitude of choice in Latinizing it. Under the rules of nomenclature one can correct typographical or orthographical errors in a published epithet or

name, and indisputably the original author is the one who knows what he intended to publish in the first place. So, a change made by the original author, when publishing a second time on the same species, is widely accepted as his correction, and a valid one. Martelli used *P. odoratissimus*, var. *savaiensis*, or var. *savaiensis*, interchangeably, *P. Boivini*, or *Boivinii*, and *y* or *i* in *poly* or *poli* freely and interchangeably. He may not have considered significant these exact details of scientific names, but whatever his concept was, he did not follow precisely any code of nomenclature. Consequently, the writer thinks that his two later spellings of *P. Macfarlanei* were not a correction, followed by a second correction, rather that they were merely careless handlings of his own epithet. Hence, the writer adopts the epithet as spelled when Martelli first published as the valid name of *P. Macfarlanei*.

In 1907 Martelli published *Pandanus Macfarlanei* as a species and maintained it in 1913; but in 1932 he published it as *P. odoratissimus* L., subsp. *P. MacFarlanei*. This seems to have been deliberate, as he wrote, "Le varietà o microspecies, che oggi si notano a Tahiti sono la sequenti: *P. odoratissimus* L. (subspecies)," and in the table of his seven subspecies *P. MacFarlanei* appears; and below it is *P. tessellatus*, classed as a subspecies of *P. edunculatus* R. Br. [= *P. pedunculatus*]. There is inconsistency in his statement that the plants were varieties or microspecies and in his accompanying publication of them as subspecies. This same material was presented in a more complete form in 1933. Here he listed and described the same seven species, including three new species under the heading ("Type of *Pandanus odoratissimus* Linn"). In his introduction he says (1933:150): "Among the collection I have received for revision from Tahiti, I find some forms or microspecies of *Pandanus odoratissimus* not yet indicated as occurring there." In the previous year he called them varieties or microspecies, and now in 1933 he calls them forms or microspecies. These are the technical names of taxa of different ranks, yet he seemed to think of them as interchangeable.

Nevertheless, his treatment of the plants in 1933 is somewhat different. His two headings are:

Type of *Pandanus odoratissimus* Linn.
and

Type of *Pandanus pedunculatus* R. Br.
He does not at this place or subsequently list the included species as minor taxa, but he gives each a binomial and treats it as a species. It seems likely that Martelli was using the method of Solms-Laubach in his Monograph of the Pandanaceae (1878). There the first species, *P. Kurzianus* Solms, is under the heading Typus *P. Kurziani*, for which he gives the synonym section *Microstigma*. *Pandanus fascicularis* Lam., with the synonym *P. odoratissimus* Roxb., and three other species are under the heading Typus *P. fascicularis* Lam. which has as a synonym the section *Keura*. So, instead of using validly named sections, Solms-Laubach selected a prominent species and, grouping with it all similar species, set them aside and called them the Group of—, or the Type of— that species. His group name is not valid, but it is harmless, and does not invalidate the species included in it. In 1933 Martelli did essentially the same thing, and despite the fact that his introductory statement calls them forms or microspecies, nevertheless in the taxonomic part that follows he describes the plants and names them as species, and we conclude that they should be accepted as validly published species.

Martelli (1933:151–152) cites two new collections from Tahiti, *Wilder* 3, pro parte, and *Setchell and Parks* 366, as *Pandanus Macfarlanei* (as *MacFarlanei*). These differ from the holotype, *Mac Farlane* XI. A detailed Latin description is given, but this gives only the characters of the new collections that differ in the size and shape of the syncarp, in the length, width, and shape of the phalanges, in the direction of the carpels and the nature of their apices, in the size of the stigmas, etc. None of the characteristics of the holotype are included. Of course, added collections representing a larger population usually expand some details of the description of a species, and Martelli had

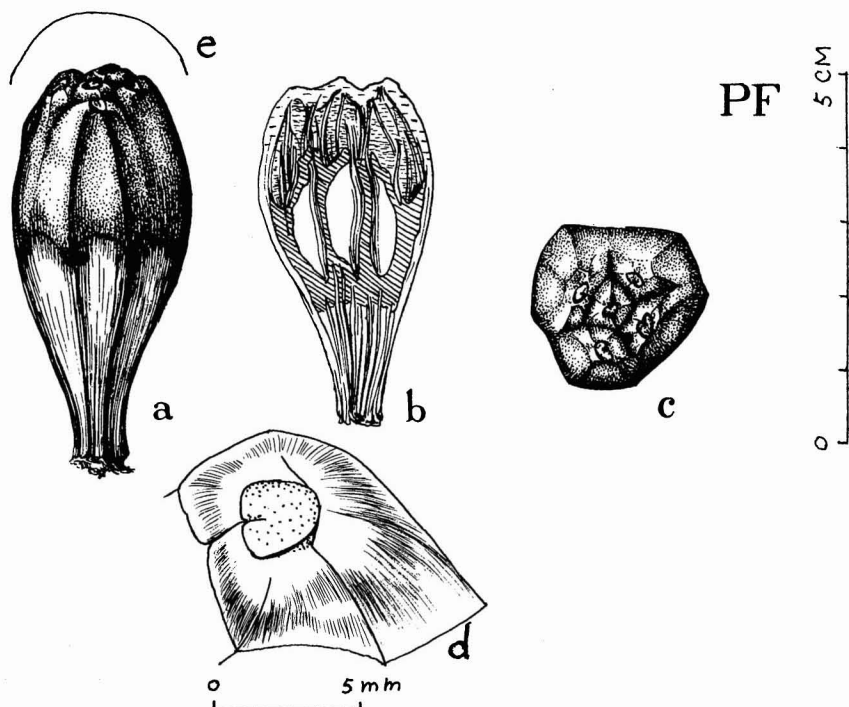


FIGURE 417. *Pandanus papeariensis* Martelli, from holotype. *a*, phalange, lateral view, $\times 1$; *b*, phalange, longitudinal median section, $\times 1$; *c*, phalange, apical view, $\times 1$; *d*, carpel apex with stigma, oblique view, $\times 4$; *e*, phalange, profile, $\times 1$.

every right to include these two collections in his circumscription of *P. Macfarlanei*. The present writer considers them of a different species and excludes them.

The holotypic collection from Tahiti, Mac Farlane XI, was unusually full. It contains a complete syncarp, and 4 leaves that Martelli accepted as this species and that agree fairly well with his diagnosis. He said they were 1.3 m long and 5 cm wide. Though a small(?) part of the apices is missing, we find them 1.14–1.36 (+0.02–0.1?) m long, 5–5.5 cm wide near the base, and 4.7–5.2 cm wide at the middle. There is no important discrepancy here. However, there are three other leaves of this same collection that look different. Their bases are fleshy and shrunk, indicating that they were attached and still growing, and were inner leaves pulled out of a leaf cluster. Their tips are incomplete, and the outer $\frac{2}{3}$ part is battered and ragged, perhaps from wind damage. They are 6.4 cm wide near the base; are coarser and thicker;

and the marginal prickles are larger and much coarser and of a different direction. To the writer these seem to be from another species.

Stone (1974:517) reduces this species to *P. tectorius* Parkins. ex Z.

Pandanus papeariensis Martelli, Soc. Tosc. Sci. Nat., Atti, Mem. 42:117, 1932, in clavi; Univ. Calif. Publ. Bot. 17:153–154, pl. 21, 1933.

Figure 417

ORIGINAL DIAGNOSIS: "Syncarpium subglobosum, circiter 13 cm. diam., pluribus phalangibus convertis instructum; pedunculo breve 1.5 cm. crasso et in sicco longitudinaliter creberrime ruguloso. Phalanges turbinato-elongatae, circiter 5 cm., et 2–2.5 cm. diam. basin-versus sensim attenuatae quasi in cauda angusta (7 mm. crassa) protractae, acute penta-hexagonae, circiter e medio ad

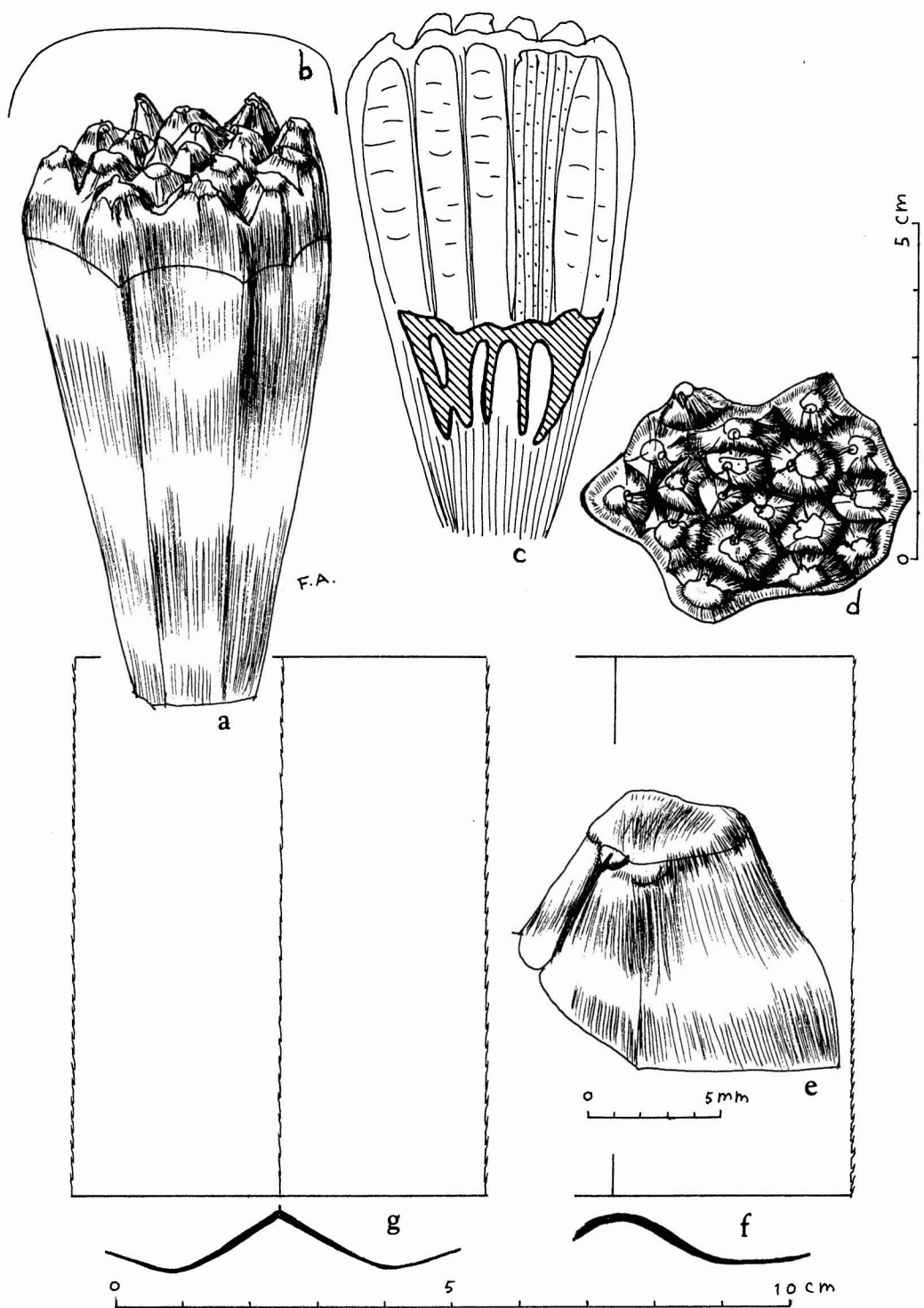


FIGURE 418. *Pandanus papenooensis* St. John, from holotype. *a*, phalange, lateral view, $\times 1$; *b*, phalange, profile, $\times 1$; *c*, phalange, longitudinal median section, $\times 1$; *d*, phalange, apical view, $\times 1$; *e*, carpel apex and stigma, oblique view, $\times 4$; *f*, half of leaf base, lower side, $\times 1$; *g*, leaf middle, lower side, $\times 1$.

basim connatae, haud fibrosae, lateribus inaequalibus latis plano-subconvexis, interdum vix longitudinaliter concavo-canaliculatis, apice phalangium vix convexo, subplano; loculis paucis (4–5) parvis, brevibus, paullo convexis irregularibus a sulcis angustis haud profundis separatis, a stigmatibus papillaeformi prominulo superatis. Endocarpium osseum in medio phalangis situm, circiter 2 cent. spissum, in sectione longitudinali superne plus minusve profunde et late fimbriatum, in toto subplanum inferne plano-subconcavum. Mesocarpium inferum compactofibrosus, superum lacunosum spongioso-fibrosus.”

EXPANDED DIAGNOSIS OF HOLOTYPE: Vegetative parts unknown; peduncle 13 mm in diameter, 3-sided, nearly straight, leafy bracted; syncarp about 15 cm long and 13 cm in diameter, subglobose, bearing about 89 phalanges, these 4.8–5.5 cm long, 2–2.7 cm wide, 1.7–2.2 cm thick, oblanceoloid, 5–6-angled, the apex convex, slightly compressed, the upper third free, the sides of gently curving planes, shining, smoothish, but minutely punctate, apparently yellowish, lateral sinuses none; carpels 4–7, ascending, but in-curving toward the apex, their apices truncate low pyramidal, central apical sinuses 1–2 mm deep, widely V-shaped, straight or slightly curving; stigmas 2–3 mm wide, flush, horizontal or slightly oblique, reniform, the apex rounded or truncate, blackish, papillose; endocarp 23 mm long, in the upper 2/3, ellipsoid, bony, dark cherry red, with conic projections above each seed, and with winglike, ascending, lateral shoulders, the lateral walls 2–3 mm thick, within shining, but spirally striate; seeds 10–13 mm long, ellipsoid; apical mesocarp 7–14 mm long, cavernous but scarcely divided, composed of longitudinal fibers and whitish membranes; basal mesocarp 16–17 mm long, fibrous and fleshy.

HOLOTYPE: Tahiti, Papeari, near the seashore, on Harrison Smith property, 2 September 1929, *Gerrit P. Wilder* 1 (UC).

ISOTYPES: (B, BISH, BM, F, FI, G, K, MO, NY, US)

SPECIMENS EXAMINED: Tahiti, Papeari, near

the seashore, on Harrison Smith property, 30 August 1929, *Wilder* 3, in part, (UC).

Pandanus papenooensis sp. nov. (sect. *Pandanus*)

NOM. VERN.: “fara moa” (= *Pandanus* of the fowls, in Tahitian language)

Figure 418

DIAGNOSIS HOLOTYPE: Arbor 8 m alta est, (trunco caulibus et radicibus incognitis), foliis 1.57 m longis proxima basem 7 cm latis in medio 6 cm latis coriaceis U-sulcatis 2-plicatis in sectione mediali cum 64 nervis parallelis secundariis in dimidio quoque nervis tertiis transversis infra in parte $\frac{1}{3}$ infera evidentis et reticula quadrata formantibus lamina supra viridi lucida infra pallide viridi gladiata ex basi ad apicem deminuenti (apice interito) basi pallida inermi, ex 24 cm marginibus cum aculeis 0.4–0.7 mm longis 1.5–3 mm separatis geniculatis crasse subulatis adscendentibus stramineis cum apicibus rubri-badiis, midnervo infra per 39 cm basales inermi, in sectione mediali marginibus cum aculeis 1.5–3 mm separatis biformatis eis majoribus 0.5–0.8 mm longis subarcuatis crasse subulatis fere adpresse adscendentibus stramineis cum apicibus obscure rubris et cum illis minoribus simulantibus 0.2–0.3 mm longis alternantibus, midnervo vicinali infra cum aculeis simulantibus eis majoribus 0.4–0.5 mm longis sed illis minoribus 0.2 mm longis, syncarpiis solitariis 19–20 cm diametro globoso cum 74 phalangibus, pedunculo 20 mm diametro trilaterato bracteato, nucleo in sicco 8.3 cm longo 2.6 cm diametro anguste ellipsoideo trilaterato fibroso duro, phalangibus 7.3–8 cm longis 3.2–4.9 cm latis (5.8 cm latis in gemine cum 27 carpellis) 2.9–4.5 cm crassis cuneiformatis 4–6-angulosis apice vadose convexo lateribus inferis planis sinibus lateralibus nullis parte $\frac{1}{8}$ supèra libera cum lateribus laevibus lucidis subconvexis angulis secundariis plerumque nullis, carpellis 14–21 radiatis, carpellis marginalibus cum apicibus late ovoidei-pyramidalibus oblique truncatis ab areola concava distali 2–5 mm lata cum stigmatibus 1–2 mm latis reniformibus valde

obliquis et compluribus truncatis a galea obscure badiis papillois, sinibus proximalibus fissura lata $\frac{3}{4}$ ad fondam extensa, carpellis interioribus cum apicibus aequalibus vel $\frac{1}{2}$ tam grandibus quam illis marginalibus et pyramidalibus illis centralibus sine areola concava sed cum stigmatibus 1–2 mm longis ellipticis ad ovatis, sinibus centralibus apicalibus 2–4 mm profundis rectis vel sinuosis V-formatis, endocarpio in parte $\frac{1}{4}$ infera et 21–23 mm longo osseoso exlucide badio late cuneiformi basi lata concava apice vadoso concavo et supra semines cum projectionibus rotundatis minimis humeris ex bordini supero adscendentibus acutis lateribus lateralibus 0.7–1 mm crassis intra olivacei-badiis lucidis laevis vel spiraliter striatis, seminibus 10 mm longis ellipsoideis, mesocarpio 42–48 mm longo indiviso cum parenchyma et fibris longitudinalibus, mesocarpio basali 6–10 mm longo fibroso et carnosio.

DIAGNOSIS OF HOLOTYPE: Tree 8 m tall; trunk, stems, and roots unknown; leaves 1.57 m long, 7 cm wide near the base, 6 cm wide at the middle, coriaceous, U-sulcate, 2-pleated, at midsection with 64 parallel secondary veins in each half, and the tertiary cross veins visible below in the lower third, forming square meshes, the blade green and shiny above, pale green below, sword-shaped, tapering from the base to the tip (the apex lost), the base pale, unarmed; beginning at 24 cm the margins with prickles 0.4–0.7 mm long, 1.5–3 mm apart, geniculate thick subulate, ascending, stramineous with reddish-brown tips; the midrib below unarmed for the first 39 cm; at midsection the margins with prickles 1.5–3 mm apart, of two sorts, the large ones 0.5–0.8 mm long, subarcuate thick subulate, almost appressed ascending, stramineous with dark-red tips, alternating with similar small ones 0.2–0.3 mm long; the nearby midrib below with similar prickles, the large ones 0.4–0.5 mm long, the small ones 0.2 mm long; syncarps solitary, 19–20 cm in diameter, globose, bearing 74 phalanges; peduncle 20 mm in diameter, 3-sided, bracteate; fruit core when dried 8.3 cm long, 2.6 cm in diameter, narrowly ellipsoid, 3-sided, fibrous, hard; phalanges 7.3–8 cm

long, 3.2–4.9 cm wide, (5.8 cm wide in a double with 27 carpels), 2.9–4.5 cm thick, cuneiform, 4–6-angled, the apex low convex, lower sides flat, lateral sinuses none, the upper eighth free, its sides smooth, shining, gently convex, secondary angles mostly none; carpels 14–21, radial; marginal carpels with apices broadly ovoid-pyramidal, the apices obliquely truncate by the concave platform 2–5 mm wide, distal of the stigma, their stigmas 1–2 mm wide, reniform, very oblique, and some of them truncate by a visor coming from the platform, dark brown, papillose; proximal sinuses a wide crack running $\frac{3}{4}$ to all the way to the valley bottom; inner carpels with apices from half as large to subequal to the marginal ones, pyramidal and the innermost ones lacking a platform, their stigmas 1–2 mm long, elliptic to ovate; central apical sinuses 2–4 mm deep, straight or sinuous, V-shaped; endocarp in the lower quarter and 21–23 mm long, bony, dull brown, broadly cuneiform, the wide base concave, the apex shallowly concave and with a slight rounded projection over each seed, the shoulders ascending from the upper rim, acute, lateral walls 0.7–1 mm thick, within olive brown, shining, smooth or spirally striate; seeds 10 mm long, ellipsoid; apical mesocarp 42–48 mm long, without perceptible divisions, rather a continuous aerenchyma of longitudinal fibers traversing parenchyma; basal mesocarp 6–10 mm long, fibrous and fleshy.

HOLOTYPE: Polynesia, Society Islands, Tahiti, Papenoo Dist., Ana Pua, with *Cerbera* and *Freycinetia*, 1220 ft alt., 6 September 1930, *M. L. Grant* 4,079 (BISH).

DISCUSSION: *Pandanus papenooensis* is a member of the section *Pandanus*, as is its closest relative, *P. aoraiensis* St. John, also of Tahiti, a species with the phalanges 8.8–10.2 cm long, 4.4–5.9 cm wide, the upper quarter free; central apical sinuses 8–10 mm deep; marginal carpels with apices ovoid, their sides with 0–2 secondary angles, their stigmas 2–2.5 mm wide, suborbicular; endocarp in the lower third and 40 mm long; apical mesocarp 37–40 mm long; leaf middle margins with two kinds of prickles, the

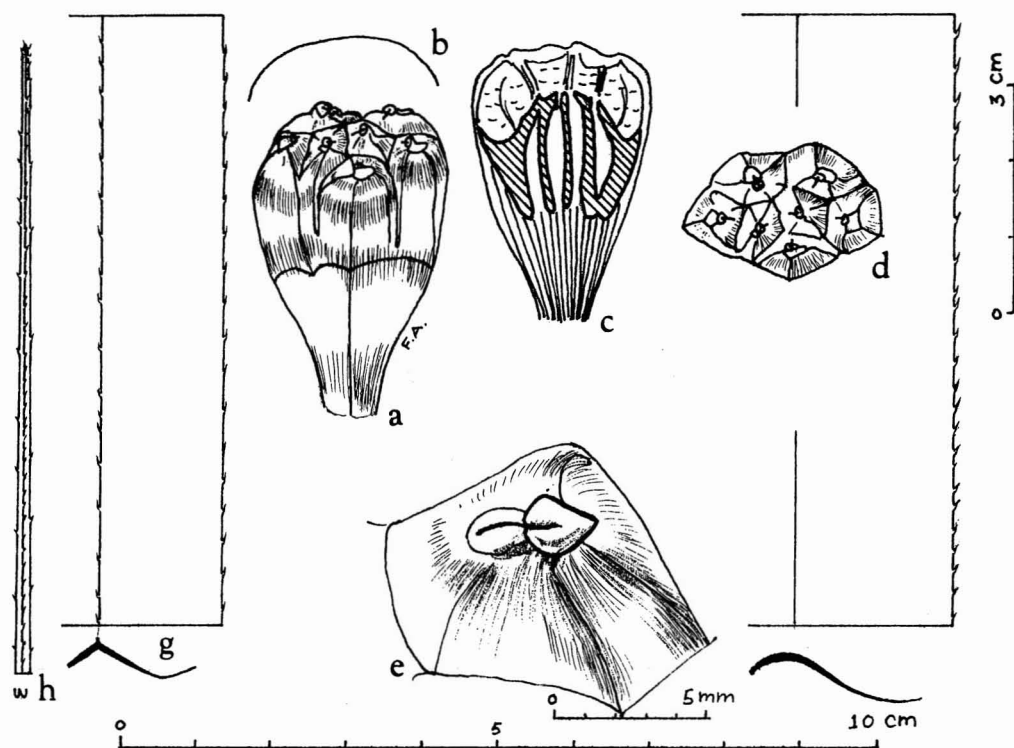


FIGURE 419. *Pandanus Parksii* St. John, from holotype. *a*, phalange, lateral view, $\times 1$; *b*, phalange, profile, $\times 1$; *c*, phalange, longitudinal median section, $\times 1$; *d*, phalange, apical view, $\times 1$; *e*, carpel apex and stigma, oblique view, $\times 4$; *f*, half of leaf base, lower side, $\times 1$; *g*, half of leaf middle, lower side, $\times 1$; *h*, leaf apex, lower side, $\times 1$.

larger ones 1.5–2 mm long. *Pandanus papenooensis* has the phalanges 7.3–8 cm long, 3.2–5.8 cm wide, the upper eighth free; central apical sinuses 2–4 mm deep; marginal carpels with apices broadly ovoid-pyramidal, their sides lacking secondary angles, their stigmas 1–2 mm wide, reniform and some truncate by a visor; endocarp in the lower quarter and 21–23 mm long; apical mesocarp 42–48 mm long; leaf middle margin with two kinds of prickles, the larger ones 0.5–0.8 mm long.

The late M. L. Grant, the collector, left this specimen marked as a new species.

The new epithet is taken from the name of the type district and valley, with *-ensis*, the Latin adjectival place suffix.

Papenoo is the largest valley in Tahiti, draining the slopes of the highest mountains. It is a name full of memories to the writer, as in 1934 he attempted to climb and botanize

the highest peak, Orofena (Orohena), 8,600 ft high. He led an expedition of three men, supplied by 10 carriers and spent ten days in the effort. From the third camp two attempts were made to scale the peak, but at 130 meters from the top the attempt was given up. The unscaled peak was not conquered, but good plant collections were gathered.

***Pandanus Parksii* sp. nov. (sect. *Pandanus*)**

Figure 419

DIAGNOSIS HOLOTYPE: Licet arbor est, statura et infructuscentia incogniti sunt, foliis 1.18 m longis proxima basem 4 cm latis in medio 3 cm latis coriaceis U-sulcatis 2-plicatis supra viridibus lucidis infra pallidior viridibus licet glaucis in sectione mediali cum 50 nervis parallelis secundariis in dimidio quoque sed nervis tertiis non evidentis

lamina gladiata ex basi in apice trigono gracile subulato deminuenti eo in puncto 10 cm ex apice 1.3 mm lato basi inermi pallida, ex 9 cm marginibus cum aculeis 0.9–1.5 mm longis 3–6 mm separatis geniculatis crasse subulatis adscendentibus stramineis, midnervo infra per partem $\frac{1}{4}$ inferam inermi, in sectione mediali marginibus cum aculeis 1.2–1.5 mm longis 4–6 mm separatis gracile subulatis adpresse adscendentibus subrubribadiis, midnervo vicinali infra cum aculeis 1–1.4 mm longis 2.5–9 mm separatis arcuatis subulatis compressis adscendentibus stramineis, in apice subulato marginibus et midnervo infra cum aculeis 0.3–0.5 mm longis arcuatis subulatis compressis adscendentibus stramineis eis marginalibus 1–4 mm separatis illis midnervi 5–15 mm separatis, phalangibus 3.5–3.9 cm longis 2.1–2.8 cm latis 1.6–2 cm crassis obovoideis cuneatis compressis 4–6-angulosis apice convexo lateribus inferis planis sinibus lateralibus quibus nunc sunt fissuris angustis fere $\frac{1}{2}$ ad fondam extensis parte $\frac{3}{7}$ supra libera cum lateribus laevibus lucidis subcurvatis, carpellis lateralibus in lateribus cum 0–1 angulis secundariis, carpellis 5–7 adscendentibus plus minusve parallelis eis marginalibus cum apicibus oblate hemisphaericis subangulosis plerumque sine sed paucis cum areola concava obliqua distali 3–4 mm lata, et cum stigmatibus 1–2 mm latis in parte horizontalibus prostratis suborbicularibus pallide badiis papillois in parte elevatis obliquis reniformibus truncatis, sinibus proximalibus fissura brevi $\frac{1}{4}$ – $\frac{2}{3}$ ad fondam extensa, carpellis centralibus cum apicibus $\frac{1}{2}$ – $\frac{3}{4}$ tam grandibus et simulantibus quam illis marginalibus et cum stigmatibus simulantibus sed omnibus elevatis et obliquis, sinibus centralibus apicalibus fere rectis V-formatis in fondo sed lateribus divergentibus, endocarpio minime supramediali 18 mm longo osseoso obscure badio corpore ellipsoideo apice supra semines cum projectionibus minutis rotundatis humeris in parte $\frac{1}{3}$ supra curvatis adscendentibus acutis lateribus lateralibus 3–4 mm crassis intra obscure mahogani-coloratis lucidis spiraliter rugosis, seminibus 9–10 mm longis ellipsoideis, mesocarpio in apice carpellae cuius-

que cavernam 4–10 mm longam cum aerenchyma fibris longitudinalibus et membranis albis formanti, mesocarpio basali 11–13 mm longo fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: Doubtless a tree; stature, roots, trunk, branches, and infructescence unknown; leaves 1.18 m long, 4 cm wide near the base, 3 cm wide at the middle, coriaceous, U-sulcate, 2-pleated, above shiny green, below paler green and apparently glaucous, at midsection with 50 parallel secondary veins in each half, but the tertiary veins not evident, the blade sword-shaped, tapering from base to the trigonous slender subulate apex, this at the point 10 cm down 1.3 mm wide, the base unarmed, pale; beginning at 9 cm the margins with prickles 0.9–1.5 mm long, 3–6 mm apart, geniculate stout subulate, ascending, stramineous; the midrib below unarmed for the lower quarter; at midsection the margins with prickles 1.2–1.5 mm long, 4–6 mm apart, slender subulate, appressed ascending, reddish brown; the nearby midrib below with prickles 1–1.4 mm long, 2.5–9 mm apart, arcuate subulate, compressed, ascending, stramineous; on the subulate apex the margins and midrib below with prickles 0.3–0.5 mm long, arcuate subulate, compressed, ascending, stramineous, those of the margins 1–4 mm apart, those of the midrib 5–15 mm apart; the pleats above unarmed; phalanges 3.5–3.9 cm long, 2.1–2.8 cm wide, 1.6–2 cm thick, obovoid, cuneate, compressed, 4–6-angled, the apex convex, lower sides flat, lateral sinuses mostly present as narrow cracks, running almost halfway down, the upper $\frac{3}{7}$ free, its sides smooth, shining, gently convex, and the lateral carpel sides with 0–1 low secondary angles; carpels 5–7, ascending, more or less parallel, the marginal ones with apices oblate hemispheric, slightly angled, mostly without but a few with a shallow sloping concave platform 3–4 mm wide, distal of the stigma, their stigmas 1–2 mm wide, in part horizontal, flush, suborbicular, pale brown, papillose, in part elevated, oblique, reniform, truncate; proximal sinuses a short crack, running $\frac{1}{4}$ – $\frac{2}{3}$ way to valley bottom; central carpels with apices $\frac{1}{2}$ – $\frac{3}{4}$ as

large as and similar to the marginal ones, their stigmas similar, but all elevated and oblique; central apical sinuses 0.5–2 mm deep, nearly straight, V-shaped to the bottom, but above the sides out-curving; endocarp slightly supramedian, 18 mm long, bony, dark brown, the body ellipsoid, the apex with minute rounded projections over the seeds, the shoulders at the upper third, curved ascending, acute, lateral walls 3–4 mm thick, within dark mahogany colored, shining, spirally rugose; seeds 9–10 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 4–10 mm long, with aerenchyma of longitudinal fibers and white membranes; basal mesocarp 11–13 mm long, fibrous and fleshy.

HOLOTYPE: Society Islands, Tahiti, Arue Point, seashore, 16 June 1922, *W. A. Setchell & H. E. Parks* 367 (BISH).

ISOTYPES: (P, UC, US)

DISCUSSION: *Pandanus Parksii* is a member of the section *Pandanus*, as is its closest relative, *P. brachus* St. John, of Rotuma Island, a species with the phalanges 3.2–3.5 cm long; central apical sinuses 3–4 mm deep; endocarp 11–13 mm long, the lateral walls 1–1.5 mm thick; marginal carpels with apices broadly pyramidal ovoid to hemispheric; stigmas 1–1.5 mm long, elliptic to obovate; leaf middle 5–5.5 cm wide, and there the margins with prickles 1.5–2 mm long, 2–9 mm apart, arcuate subulate, compressed, strongly ascending, the base stramineous, the free part reddish brown. *Pandanus Parksii* has the phalanges 3.5–3.9 cm long; central apical sinuses 0.5–2 mm deep; endocarp 18 mm long, the lateral walls 3–4 mm thick; marginal carpels with apices oblate hemispheric, slightly angled; stigmas 1–2 mm wide, suborbicular to reniform; leaf middle 3 cm wide, and there the margins with prickles 1.2–1.5 mm long, 4–6 mm apart, slender subulate, appressed ascending, reddish brown.

The new epithet is chosen to honor the collector, Harold Ernest Parks (1880–1968), mycologist and botanist, collector for the Botany Department, University of Cali-

fornia, Berkeley, California; assistant to W. A. Setchell on his expeditions to Polynesia; and collector for the Bernice P. Bishop Museum, Honolulu.

Pandanus prismaticus Martelli, Soc. Tosc. Sci. Nat., Atti, Mem. 42:117, 1932; Univ. Calif. Publ. Bot. 17:152, pl. 18, 1933.

Figure 420

ORIGINAL DIAGNOSIS: "Syncarpium cernuum, solitarium, globoso-oblongum, 20–25 cm. circiter diam., a numerosis phalangibus, in parte libera inter se divericatis, instructum. Phalanges 6 cm. longae, in dimidia superiore parte prismaticae, liberae, cubum simulates, acute angulosae, ibique circiter 3 cm. diam.; lateribus latis, subplanis vel canaliculatis, interdum, secundum suturam loculorum, sulco angustissimo notatis; in dimidia inferiori parte connatae, fibroso-compactae, subabrupte attenuatae et in basim acutissimam desinentes, supra planae vel vix convexae, loculis 8–10, mediocribus vel parvulis brevibus, convexo-pyramidatis, a sulcis superficialibus latiusculis separatis; sulcis a linea suberosa circumscriptis; stigmata mediocra, superantia. Endocarpium osseum in medio phalangis locatum, ambitu, in toto, rotundatum, 2–2.5 cm. spissum, in sectione longitudinali, supra, rotundato-vix pyramdatum, subfimbriatum, inferne rotundatum; mesocarpium superum 5–8 mm. spissum, cavernis parvis, spongioso-fibrosis; mesocarpium inferum ultra 2 cm. spissum, fibroso-subcompactum."

EXPANDED DIAGNOSIS: Doubtless a tree; stature, roots, trunk, branches, and leaves unknown; peduncle 24 mm in diameter; syncarp 27 cm long, 23 cm in diameter, broadly ellipsoid, solitary; phalanges 5.2–5.8 cm long, 3.1–3.5 cm wide, 2.7–3.2 cm thick, obovoid or oblanceoloid, slightly compressed, 4–6-angled, the apex convex or low convex, lower sides flat, lateral sinuses wanting between half or more than half of the carpels, but present between the others as narrow cracks running down to or nearly to the middle, the upper half free, the sides smooth, shining, gently convex, the lateral

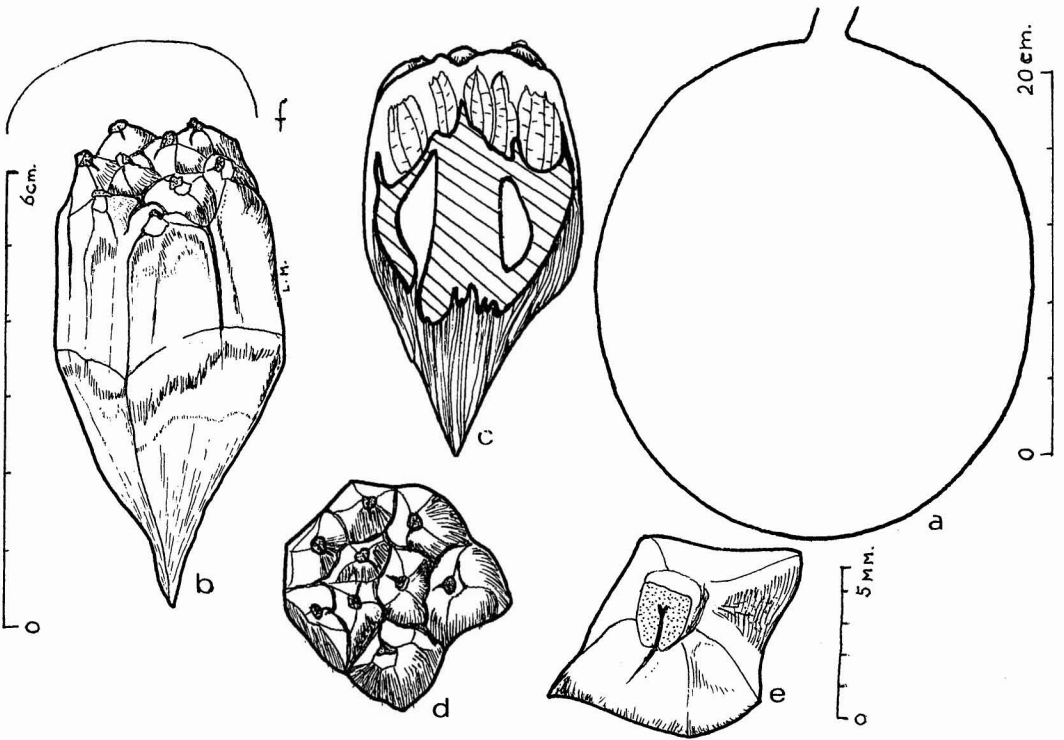


FIGURE 420. *Pandanus prismaticus* Martelli, from isotype (BISH). *a*, profile of syncarp, $\times \frac{1}{4}$; *b*, phalange, lateral view, $\times 1$; *c*, phalange, longitudinal median section, $\times 1$; *d*, phalange, apical view, $\times 1$; *e*, carpel apex and stigma, oblique view, $\times 4$; *f*, phalange, profile, $\times 1$.

carpels with 0–1 low secondary angles; marginal carpels with apices oblate angled hemispheric, and mostly with a concave platform 3–4 mm wide, distal of the stigma, this 2.3–3.2 mm wide, apical, flush, horizontal, reniform or suborbicular, and mostly truncate, brown, papillose; proximal sinuses a narrow crack running from halfway to all the way to the valley bottom; inner carpels with apices subequal to or as little as $\frac{2}{3}$ the size of the marginal, pyramidal or oblately pyramidal; the inner stigmas similar but elliptic to orbicular; central apical sinuses 1–3 mm deep, widely V-shaped, straight; endocarp in the upper $\frac{2}{3}$ and 25–26 mm long, dark brown, suborbicular to broadly ellipsoid, with a lanceoloid projection over each seed, the lateral walls 3–4 mm thick, within dark reddish brown, shining, spirally striate elsewhere, but at apex rugose; seeds 12–14 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 5–13 mm

long, with aerenchyma of longitudinal fibers and white membranes; basal mesocarp 19–22 mm long, fibrous and fleshy.

HOLOTYPE: Tahiti, near the seashore, on Harrison Smith property at Papeari, 30 August 1929, *Gerrit P. Wilder* 2 (UC).

ISOTYPES: (BISH, FI). Types examined.

SPECIMENS EXAMINED: Tahiti, Atiue, 17 July 1922, *W. A. Setchell* & *H. E. Parks* 556 (BISH, UC).

DISCUSSION: Martelli described this species from a single collection, *Wilder* 2, so that is automatically the holotype, but he did not indicate the herbarium to which it belonged. He was publishing on a series of collections of Pandanaceae sent to him by *W. A. Setchell* of the University of California at Berkeley. The writer has studied all those in Martelli's herbarium, now at Firenze, and those at Berkeley. The latter herbarium has

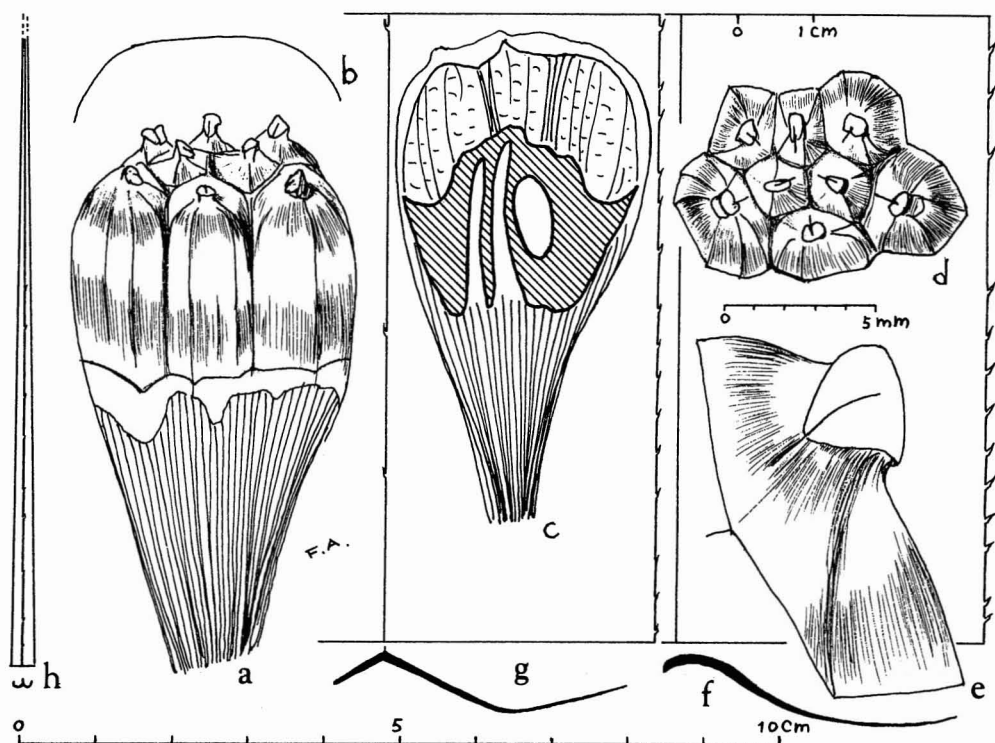


FIGURE 421. *Pandanus subradiatus* St. John, from holotype. *a*, phalange, lateral view, $\times 1$; *b*, phalange, profile, $\times 1$; *c*, phalange, longitudinal median section, $\times 1$; *d*, phalange, apical view, $\times 1$; *e*, carpel apex and stigma, oblique view, $\times 4$; *f*, half of leaf base, lower side, $\times 1$; *g*, half of leaf middle, lower side, $\times 1$; *h*, leaf apex, lower side, $\times 1$.

the most complete specimens of this series, while those at Firenze are meager. The specimen in the Bishop Museum was labeled and distributed from the University of California. Hence, we now designate the specimen of this species in the Berkeley herbarium as the holotype.

***Pandanus subradiatus* sp. nov. (sect. *Pandanus*)**

P. Menziesii sensu Martelli, Univ. Calif. Publ. Bot. 17:151, pl. 16, figs. 1-2, 1933, non Gaud. (1841).

Figure 421

DIAGNOSIS HOLOTYPE: Licet arbor est sed statura trunco ramisque incognitis, foliis 1.59 (+0.02-0.05?) m longis proxima basem 8 cm latis in medio 6-7 cm latis coriaceis U-sulcatis 2-plicatis supra viridibus lucidis infra pallidiore viridibus et licet glaucis in sectione

mediali cum 59-63 nervis parallelis secundariis in dimidio quoque nervis tertiis transversis supra ad basim evidentis et reticula oblonga formantibus lamina gladiata ex basi in apice longo gracile subulato deminuenti eo in puncto fere 10 cm ex apice 1.5 mm lato basi inermi pallida, ex 6.5-7 cm marginibus cum aculeis 1.3-1.8 mm longis 3-9 mm separatis subsigmoideis subulatis compressis adscendentibus stramineis, midnervo per partem $\frac{1}{4}$ inferam inermi, in sectione mediali marginibus cum aculeis 0.7-1 mm longis 4-9 mm separatis arcuatis subulatis valde adscendentibus infra stramineis sed apicibus badiis, midnervo vicinali infra cum aculeis 0.5-0.7 mm longis 15-40 mm separatis arcuatis subulatis adpresse adscendentibus stramineis cum apicibus badiis, apice subulato inermi, syncarpio 26.8 cm longo 25.5 cm diametro subgloboso, phalangibus 6.5-6.7 cm longis 3.4-3.7 cm latis 2.5-2.8 cm crassis oblanceoloideis 4-6-angulosis

apice vadoso convexo lateribus inferis planis sinibus lateralibus fissura angusta ad medium descendenti parte $\frac{1}{5}$ supera libera laevi lucida, carpellis exterioribus cum lateribus cum planis compluribus sursum curvatis et apicibus convexis angulosis ad oblate pyramidali-conicis, stigmatibus 2.5–3 mm longis vel latis suborbicularibus elevatis obliquis truncatis badiis papillosis, carpellis 4–8 anguste radiatis vel subparallelis, sinibus proximalibus fissura $\frac{1}{2}$ – $\frac{2}{3}$ ad fondam extensa, sinibus centralibus apicalibus 2–3 mm profundis late V-formatis fere rectis, carpellis interioribus $\frac{1}{2}$ tam grandibus vel subaequalibus ad eas marginales convexis, endocarpio in parte $\frac{1}{3}$ supera et 25 mm longo osseoso badio corpore late ellipsoideo et ex medio cum humeris crassis curvatis adscendentibus apice supra semines cum projectionibus ovoideis lateribus lateralibus 5–6 mm crassis intra aurantiaci-badiis lucidis sublaevibus, seminibus 10–12 mm longis ellipsoideis, mesocarpio in apice carpellae cuiusque cavernam 8–18 mm longam cum aerenchyma fibris longitudinalibus et membranis albis formanti, mesocarpio basali 29–31 mm longo fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: Doubtless a tree, but stature, trunk, and branches unknown; leaves 1.59 (+0.02–0.5?) m long, 8 cm wide near the base, 6–7 cm wide at the middle, coriaceous, U-sulcate, 2-pleated, above green and shiny, below paler green and apparently glaucous, at midsection with 59–63 parallel secondary veins in each half, and the tertiary cross veins seen above near the base, forming oblong meshes, the blade sword-shaped, tapering from base to the trigonous long slender subulate apex, this at the point about 10 cm down 1.5 mm wide, the base unarmed, pale; beginning at 6.5–7 cm the margins with prickles 1.3–1.8 mm long, 3–9 mm apart, subsigmoid subulate, compressed, ascending, stramineous; the midrib below unarmed for the lower quarter; at midsection the margins with prickles 0.7–1 mm long, 4–9 mm apart, arcuate subulate, strongly ascending, stramineous below but the tips brown; the nearby midrib below with prickles 0.5–0.7 mm long, 15–40 mm

apart, arcuate subulate appressed ascending, stramineous with brown tips; on the subulate apex the margins and midrib unarmed; the pleats above unarmed; syncarp 26.8 cm long, 25.5 cm in diameter, subglobose; phalanges 6.5–6.7 cm long, 3.4–3.7 cm wide, 2.5–2.8 cm thick, oblanceoloid, 4–6 angled, the apex low convex, lower sides flat, lateral sinuses narrow cracks extending down to the middle, the upper fifth free, smooth, shining, the outer sides of the lateral carpels with several up-curving planes; marginal carpal apices angular convex to oblate pyramidal conic; stigmas 2.5–3 mm long or wide, suborbicular, elevated, oblique and truncate, brown, papillose; carpels 4–8, narrowly radial or subparallel; proximal sinuses a crack running $\frac{1}{2}$ – $\frac{2}{3}$ way to valley bottom; central apical sinuses 2–3 mm deep, very widely V-shaped, nearly straight; inner carpal apices from half as large to subequal to the marginal ones, convex; endocarp in the upper third and 25 mm long, bony, chocolate brown, the body broadly ellipsoid and with median, heavy curved ascending shoulders, the apex with an ovoid projection over each seed, lateral walls 5–6 mm thick, within orange brown, shining, smoothish; seeds 10–12 mm long, ellipsoid; mesocarp forming in the apex of each carpal a cavern 8–18 mm long, with aerenchyma of longitudinal fibers and white membranes; basal mesocarp 29–31 mm long, fibrous and fleshy.

HOLOTYPE: Polynesia, Society Islands, Tahiti, Pheu Dist., Motu Nono, beach, coral soil, 5 ft alt., 24 February 1931, *M. L. Grant* 5,430 (BISH).

ISOTYPE: (FI)

DISCUSSION: *Pandanus subradiatus* is a member of the section *Pandanus*, as is its closest relative, *P. Macfarlanei* Martelli, also of Tahiti, a species with the syncarp 19 cm in diameter, subglobose; phalanges 5.8–6.1 cm long, 2.3–3.4 cm wide, the central apical sinuses 1.5–2.5 mm deep; carpels parallel; endocarp longer than wide; basal mesocarp 22–25 mm long; leaf middle 4.6 cm wide, and there with 39 parallel secondary veins in each half, and there the margins with prick-

les 2.5–3 mm long, 6–13 mm apart, straight slender subulate from a long sloping base, very strongly ascending, stramineous with red tips. *Pandanus subradiatus* has the syncarp 25.5 cm in diameter, subglobose; phalanges 6.1–6.7 cm long, 3.4–3.7 cm wide, the central apical sinuses 2–3 mm deep; carpels narrowly radial or subparallel; endocarp wider than long; basal mesocarp 29–31 mm long; leaf middle 6–7 cm wide, and there with 59–63 parallel secondary veins in each half, and there the margins with prickles 0.7–1 mm long, 4–9 mm apart, arcuate subulate, strongly ascending, stramineous below but the tips brown.

There is another collection that is to be referred here: *G. P. Wilder* 3, part A, seashore, Papeari, 30 August 1929 (BISH, one phalange; FI, $3\frac{1}{2}$ phalanges). Martelli first determined this as *Pandanus pedunculatus* R. Br., of Australia, then later as *P. Menziesii* Gaud., of Hawaii (Univ. Calif. Publ. Bot. 17:151, pl. 16, figs. 1–2, 1933). We cannot agree with either of these two determinations. The collection of fruits is meager, and the leaves and other parts are lacking. It conforms quite well with *P. subradiatus*.

Another collection, *Wilder* 3, part B, has the phalanges 5.2–5.3 cm long. It consists of 3 phalanges (UC), 1 phalange (FI), and 1 phalange (BISH). In its other characters it is like *Pandanus subradiatus*, and for the present it seems best to place it there.

The new epithet is formed from the Latin *sub*, somewhat, *radiatus*, radial, and it refers to the more or less radial carpels of the phalange.

Pandanus tahitensis Martelli, Webbia 2:428–429, 1907; 4(1):33, 90, 94, t. 7, figs. 1–3, 1913, legend, 1914: Soc. Tosc. Sci. Nat., Atti, Mem. 42:117, 1932; Univ. Calif. Publ. Bot. 17(7):152, 1933; Stone, Biol. Soc. Wash., Proc. 80:55, 1967 (sect. *Pandanus*)

NOM. VERN.: “fara uteute”

Figure 422

ORIGINAL DIAGNOSIS: “Folia coriacea, circiter 1.50 m. longa, 8 cm. lata, et basi vix dilatata ibique amplexantia per totam

earum longitudinem superne senim attenuata, apice acuminato, utrinque minute longitudinaliter venulosa, costa media acuta, prominula, basi evanescenti, usque ad medium inermi, deinsuper aculeis rarissimis, minutis, apicem versus densioribus praedita; marginibus in parte basilari inermibus, caeterum spinis tenuibus, subulatis erecto-patentibus armatis. Syncarpium globoso-oblongum, 21 cm. longum 19 cm. diam.; phalanges numerosae, in tertiam superiorum partem liberae et divergentes, pyriformes, $7\frac{1}{2}$ cm. longae, 4–5 cm. latae rotundato-compressae, $3-3\frac{1}{2}$ cm. crassae, irregulariter pentagonae, faciebus planis, levibus, in vertice convexae; loculis, 6–8, vix conspicuis, subangulosis; sulcis interocularibus superficialibus, saepe oblitteratis; stigmatibus validiusculo ad verticem loculorum sito. Endocarpium osseum, in sectione longitudinali subsemilunare et in parte centrali, inter cornua, elevatum.”

EXPANDED DIAGNOSIS OF HOLOTYPE: Doubtless treelike, but roots, trunk, and branches unknown; leaves 1.35 (+0.08–0.15?) m long, 7.6–8.7 cm wide near the base, 5–6 cm wide at the middle, coriaceous, above shiny green, below paler green and glaucous, U-sulcate, 2-pleated, at midsection with 53–55 parallel secondary veins in each half, but no visible tertiary veins, the blade sword-shaped, tapering from the base to the slender apex (the tip lost), the base unarmed, pale; beginning at 8 cm the margins with the lowest prickles 2 mm long, 3–4 mm apart, subsigmoid subulate, ascending, stramineous with pink tips, the next ones 2.5–3 mm long, 4–14 mm apart, straight slender subulate, ascending, stramineous, pink tipped; the midrib below unarmed almost to the middle; at midsection the margins with prickles 1.3–2.2 mm long, 5–12 mm apart, oblique lanceolate, compressed, appressed ascending, brown tipped; the nearby midrib below with prickles 1.3–1.6 mm long, 32–52 mm apart, strongly arcuate thick subulate, compressed, strongly ascending, stramineous; the pleats above unarmed; infructescence a solitary syncarp; peduncle 23 mm in diameter, 3-sided, bracteate; syncarp 21 cm long, 19 cm in diameter, broadly ovate-ellipsoid, bearing 90

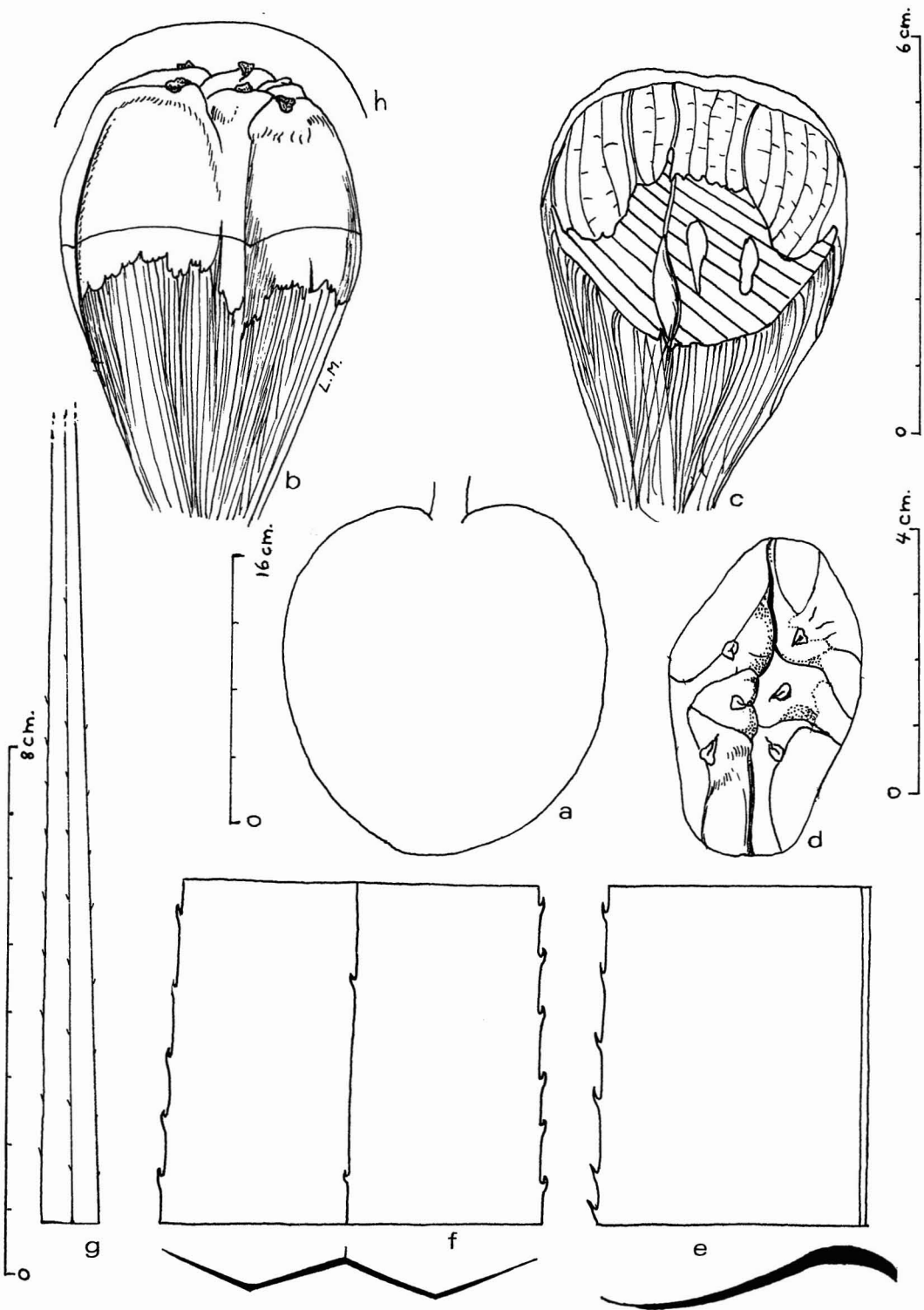


FIGURE 422. *Pandanus tahitensis* Martelli, from holotype. *a*, profile of syncarp, $\times \frac{1}{4}$; *b*, phalange, lateral view, $\times 1$; *c*, phalange, longitudinal median section, $\times 1$; *d*, phalange, apical view, $\times 1$; *e*, half of leaf base, lower side, $\times 1$; *f*, leaf middle, lower side, $\times 1$; *g*, leaf near apex, lower side, $\times 1$; *h*, phalange, profile, $\times 1$.

phalanges, these 6.6–6.7 cm long, 4–5.5 cm wide (6 cm wide in a double with 11 carpels), 2.3–3.5 cm thick, pyriform or broad pyriform, compressed, 5–6-angled, the apex convex, the lower sides flat, lateral sinuses none, the upper $\frac{3}{8}$ free, the surface bright red, smooth, shining, the sides gently convex; carpels 4–8, ascending, more or less parallel, the marginal ones with apices very low convex and blending into the curve of the phalange, mostly without perceptible angles, the inner apices similar but $\frac{1}{2}-\frac{2}{3}$ as large as the marginal ones; central apical sinuses 0–1 mm deep, mostly so shallow as to be scarcely perceptible other than as tessellate markings; stigmas 2–4 mm long, apical, flush, cordate or obovate and many of the marginal ones truncate at apex, brown papillose; endocarp in the upper $\frac{3}{8}$ and 27 mm long, bony, dark brown, the lower half hemispheric, almost as broad as the phalange and the margins extended as broad up-curved winglike shoulders, the upper half only half as broad as the phalange, roughly hemispheric but with short conic projections over the seeds, the lateral walls 8–14 mm thick, within smooth and shining; seeds 12–16 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 13–24 mm long, with aerenchyma of many longitudinal fibers and soft parenchyma; basal mesocarp 25–29 mm long, fibrous and fleshy.

HOLOTYPE: French Polynesia, "Isola Tahiti nell' Arcipelago della Società.—Racc. A. Mac Farlane 1905 (no. 2 in herb. Martelli)." Now in (FI). Specimen examined.

DISCUSSION: The holotype is a full, excellent collection of a complete syncarp and three sheets with four leaves. For labels there is a tag with, in Mac Farlane's handwriting, "No. 2, Bright red seeds, 'Fara uteute.'" To this Martelli added, "Isole Taiti, 1906, Mac Farlane." These data Martelli repeated on the labels for the sheets, except that he changed the date to 1905, and so published it. The other Tahitian species collected by Mac Farlane, *Pandanus Macfarlanei*, is recorded as collected in 1904. Of the four collections by Mac Farlane from the Tubuai Islands, one is recorded as taken in 1906,

and three in 1905. Hence, it appears that Mac Farlane collected for Martelli in Polynesia over a period of several years and that he made several shipments of the specimens. There is no definite basis now for changing his dates. The deduction is, then, that *P. tahitensis* was collected in 1906. However, in Martelli's two treatments of these Polynesian species there are inexcusable confusions, such as interchanging and publishing the wrong pictures as illustrations for the species, so these two publications contain some serious errors, and they are not above criticism. The syncarp of the holotype Martelli labeled with a spelling of the geographic epithet very different from the one he published. Stone (1967:55) now states that this species was "Formerly supposed to be a Tahitian endemic; but if I am correct in the identification, it is found in Tonga and Fiji at least in the form of separate varieties. Here, however, only an undescribed variety from Niue is discussed." The writer does not concur with Stone's treatment.

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